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49. Perfect and progressive

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This article surveys the major approaches to the semantics of the perfect and progressive. While it may not seem difficult to describe the meaning of these constructions informally, both present empirical puzzles, within and across languages, which show that initial descriptions do not do justice to their meanings. As a result, a range of analyses of the perfect and progressive have been developed. These analyses are important not only in their roles as attempts to formalize the meaning of the construction in question, but also because they have developed tools which have proven fruitful in other areas of linguistic theory.

49. Perfect and progressive

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1. Introduction

This article discusses two aspectual constructions which are prominent in English and many other languages, and which have received a great deal of attention within semantic theory. They are worth studying because they are of linguistic interest in their own right (as are the prominent constructions of any language) and more importantly because of the in-depth research they have triggered. We have learned a great deal about the temporal semantics, event semantics, modal semantics, and various other issues, from the progressive and the perfect.

2. The perfect

The perfect is a grammatical construction which is built from a participial verb phrase and an auxiliary, and which indicates temporal anteriority (roughly, past-ness) as part of its meaning.

- (1) Ben has fallen asleep.

The most basic goal of theories of the perfect is an analysis of the type of anteriority it indicates. It is not simply the kind of past meaning expressed by the past tense, as we can see in English from the contrast in (2):

- (2) a. *Ben has fallen asleep yesterday afternoon.
b. Ben fell asleep yesterday afternoon.

It is generally assumed that this construction is identifiable across languages (at least, western Indo-European ones):

- (3) Jean est arrivé hier. (French, Schaden 2009)

- Jean be.pres arrived yesterday
'Jean arrived yesterday.'
- (4) Mario era partito giovedì. (Italian, Giorgi & Pianesi 1997)
Mario be.imperf departed Thursday
'Mario had left Wednesday.'
- (5) Eva hat seit drei Stunden geschlafen. (German, Musan 2003)
Eva have.pres since three hours slept
'Eva has slept for three hours.'
- (6) Sigurd har kommit. (Swedish, Rothstein 2008)
Sigurd have.pres come
'Sigurd has come.'

There are a number of important differences among the perfects of various languages, most famously in the acceptability of sentences like (2a), and their analysis is one of the main topics which has motivated contemporary studies.

When the tense of the sentence, represented on the auxiliary, is the present tense, as in (1), the construction is known as the present perfect. Likewise, we have the past perfect, future perfect, and tenseless perfects:

- (7) a. Ben had fallen asleep.
b. Ben will have fallen asleep.
c. Having fallen asleep, Ben was carried to his bed.

Given that the perfect is a complex construction built out of multiple morphosyntactic pieces, a compositional analysis of the perfect must determine an appropriate syntactic analysis, figure out what components of the overall construction's meaning are associated with each piece, and understand the nature of the processes which combine these components together. It is also possible that some aspects of the perfect's meaning are not derived compositionally, but rather associated with the construction as a whole.

Almost all recent research on the perfect assumes a crucial role for pragmatics in explaining the meaning and use of the perfect, though there is not agreement on which component of pragmatic theory is relevant. An important role for pragmatics is motivated from two directions: first, some key data (e.g., that in (2a)) turns out to resist analysis in terms of compositional semantics, and thus some authors have turned to a pragmatic account. (Others turn to syntax, as we will see below.) And second, the intuitive function of the perfect seems to vary among various discourse contexts, giving rise to the tradition of identifying a number of "readings" of the perfect. Portner (2003) gives the following examples:

- (8) Resultative perfect: Mary has read *Middlemarch*.
(9) Existential perfect: The earth has been hit by giant asteroids before (and probably will be again).
(10) Continuative perfect: Mary has lived in London for five years.
(11) Hot news perfect: The Orioles have won!

It is generally assumed that much of this variation is pragmatic in nature, though there remains controversy over whether the continuative perfect, i.e. examples in which the eventuality (in (10), of Mary living in London) continues up to the time indicated by the main tense (here the present), is semantically different from the others, or just pragmatically different.

In the discussion which follows, I make a distinction between primary theories of the perfect, and secondary theories. Primary theories, described in Section 2.2, are those designed to capture the most basic facts, such as anteriority. Moreover, it is often assumed that, if we can get the details right, the correct primary theory of the perfect will suffice to account for all of the relevant phenomena. In contrast to this view, other scholars have developed a number of secondary ideas about the perfect's meaning; these theoretical ideas, discussed in Section 2.3, are intended to be combined with one or the other primary theory, accounting for some body of facts which cannot be attributed to the core, or primary semantics.

In this overview, I will begin in section 2.1 by outlining the key data which forms the empirical base for contemporary research on the perfect. Then in section 2.2 I will outline the three primary theories which are important in the recent literature. In section 2.3, I will examine five secondary theories. In Section 2.4, I will discuss how the primary and second theories have been put together in the recent literature.

2.1 Outline of key data

In this section, I will list a number of linguistic phenomena which have been important in the development of semantic theories of the perfect. There is of course much more data which could be extracted from the large literature on the topic, and so in the interests of space and accessibility, it cannot be helped that I select a portion, with the goal of identifying the facts which are crucial to understanding the various theories and debates which we will turn to in later sections.

2.1.1 Continuative vs. non-continuative readings

Sometimes in a perfect sentence, the eventuality described by the verb phrase is still ongoing at the time indicated by the tense, and sometimes it must have been completed before that time. The former case, (12), is known as a continuative or universal perfect, while the latter, (13), is known as a non-continuative or existential perfect:

- (12) a. John has been sick for several days.
b. I have understood.
c. Mary has been swimming since noon.

- (13) a. John has slept.
b. I have already eaten lunch.
c. Mary has been swimming before.

Continuative readings are only possible with perfects built out of stative VPs, where in English the relevant notion of stativity includes individual level-predicates, copular sentences, and progressives, but not non-dynamic stage-level verbs (see Dowty 1979, Mittwoch 1988, Vlach 1993, Portner 2003; see Iatridou et al. 2003 for relevant crosslinguistic data). Thus (13a), which is stage level, does not have a continuative interpretation. Stative predicates also allow existential readings, as seen in (13c), while non-statives only allow existential readings. The particular combination of aspectual factors which allows for the continuative reading differs across languages. For example, in German a non-progressive activity predicate allows a continuative reading (presumably because the base verb covers the meanings which are expressed by both the progressive and non-progressive forms in English):

- (14) Maria hat seit langem auf Hans gewartet. (Musan 2002: 143)
Maria has since long on Hans waited
'Maria has been waiting for Hans for a long time.'

There has been debate over whether the continuative/existential difference is grammatical or pragmatic in nature. The simplest form of pragmatic view says that the existential reading is basic, and that the continuative interpretation is really just a special case. The idea is that, in general, the present perfect entails the existence of some interval of time at which the core clause is true, and which begins before the speech time; if this interval happens to include the speech time, we have a continuative perfect. Against this hypothesis, Mittwoch (1988) points out that the continuative reading of (15) entails that Sam was in Boston on Tuesday, while its existential reading is false if he was there only on Tuesday.

- (15) Sam has been in Boston since Tuesday.

Mittwoch's example shows that the continuative reading is not simply a subcase of the non-continuative reading.

A second fact which tends to favor a grammatical analysis is that it is very difficult to find a continuative interpretation in the absence of a temporal adverbial, as pointed out by Iatridou et al. (2003) and Portner (2003). The following contrast is from Portner:

- (16) a. Mary has lived in London for five years.
b. Mary has lived in London.

(Other relevant adverbials include *always* and the much-discussed *seit* in German, cf. e.g., von Stechow 2001, Musan 2002, Löbner 2002, Rathert 2004.) However, Nishiyama & Koenig (2004) dispute the claim that an adverbial is necessary for a continuative reading on the basis of the data in (17), reporting that their informants judge this sentence as having the continuative interpretation:

- (17) John has been sick.

It would be helpful to know what exactly Nishiyama & Koenig's informants judged, since what's essential is not whether (17) can be true if John is still sick at the speech time, but rather whether it has a reading entailing that he is. And this will be a difficult point to judge, given that it is not in dispute that the sentence has an existential reading, which does not entail he is still sick.

Even though it is possible that (17) does have a continuative reading, this does not necessarily undermine the argument that the continuative/existential contrast has a grammatical basis. It is not essential to that argument that an adverbial be involved in every continuative sentence. Indeed, Vlach (1993) has already pointed out that perfects formed from a progressive have a continuative reading in the absence of an adverbial, and this did not deter Portner (2003) from making the argument. If Nishiyama & Koenig are right about (17), this shows that certain perfect copular sentences are like perfect progressives. Despite all of this, the lack of a continuative reading of (16b) remains a clear fact, and may still constitute an argument in favor of a grammatical analysis of the continuative/non-continuative contrast. What's essential, but not yet known, is whether the difference between the cases where the adverbial is a prerequisite for the continuative reading, and those where it is not, should be defined in pragmatic terms (e.g., the presence of the adverbial makes the continuative reading more plausible), or grammatical ones (e.g., a certain lexical class of verbs requires the adverbial). At first glance, it seems difficult to account for the sharp contrast seen in (18) in pragmatic terms:

- (18) Child: Can John come out and play?
John's mother:
- a. No, sorry, he's been sick. (Nishiyama & Koenig's example)
 - b. No, sorry, he has been living in London. (perfect progressive)
 - c. No, sorry, he has lived in London for several weeks now. (non-progressive perfect with an adverbial)
 - d. *No, sorry, he has lived in London. (non-progressive perfect with no adverbial)

Even this context which seems to support continuative readings for (18a-c) does not allow one for (18d). (Of course (18d) is fine if the mother means that people who have ever lived in London are unfit to play with the children, but it can't mean that he's unavailable to play because he is currently in London, in contrast to (18b-c).)

A third set of facts involving adverbials has also been used to argue that the continuative/non-continuative contrast is grammatical in nature. Dowty (1979) points out that preposing a *for* adverbial seems to force the continuative reading, as in (19a), and in contrast to (19b), which can be either continuative or non-continuative:

- (19) a. For a week, Mary has lived in London.
b. Mary has lived in London for a week.

Dowty's claim is supported by Mittwoch (1988) and Portner (2003), among others, but disputed by Abusch & Rooth (1990), Rathert (2003, 2004), and Nishiyama & Koenig (2004). While Abusch & Rooth and Nishiyama & Koenig give isolated examples about which judgments may differ, Rathert (2003) seeks to provide stronger evidence in the form of naturally occurring data. She cites the following passage (Rathert 2003: 378):

To say I am frustrated with the problem of school lunches is just not going to cut it. I am positively erupting... and ash and lava are everywhere. My son started high school this year. I had heard someone say that this school had some healthy choices. NOT!!! *For two weeks he has eaten tacos without cheese, chicken nuggets and fries.* His other choices were popcorn shrimp and onion rings and sodas. This not only costs too much (\$4) but is death food. A couple of years ago I called the man who oversees the buying and planning of all the school lunches. He claims that fast food is what kids get at home, and if kids are going to buy the school lunches, he needs to supply them with food they know and will buy. He claims that if he served them healthier food that the food service couldn't sustain itself because not enough kids would buy lunch. I suggested he might offer baked potatoes, rice, choices without cheese, and grilled meats and vegetables. And for about a month I saw changes on the menu. Then, back to the worst.

Rathert (2003: 378) says:

The two weeks of unhealthy food cannot abut speech time because after these weeks the mother contacted "the man who oversees the buying and planning of all the school lunches". And even after this, "for about a month I saw changes on the menu. Then, back to the worst..."

However, this interpretation of the passage is not correct. The son started high school "this year", but the mother contacted the man in charge "a couple of years ago." Thus, clearly, she had contacted him before her son was in high school, and the temporary changes to the menu also happened before the son entered high school. In other words, the events which Rathert interprets as having followed the stretch during which had ate tacos, nuggets, and fries, actually represent a flashback to an earlier episode. The key sentence itself is indeed a continuative perfect.

Rathert (2004) gives a number of other naturally occurring examples, but none are without difficulties, and all must be assessed with the level of care given to those above. Rothstein (2008) also expresses skepticism of Rathert's conclusions on the basis of the fact that it is often not clear whether data found on the web were produced by native speakers. (From my reading of her examples, only one seems to show clear signs of having been produced by a non-native speaker.) In considering all of this, it is important to note that there are plenty of examples of continuative perfects with preposed *for* phrases, and plenty of non-continuative perfects with non-preposed *for* phrases. We do not expect ungrammatical forms to have zero occurrence in the web, only very low

frequency, relative to similar forms. Overall, then, given that there are no, or at least extremely few, examples of non-continuative perfects with preposed *for* phrases, it seems likely that Dowty is correct, and that preposing really does disambiguate in favor of a continuative reading (though of course further corpus research may require us to rethink this matter once again). This in turn supports the hypothesis that the continuative/non-continuative contrast is grammatical in nature.

2.1.2 Interactions with adverbials

Across languages, the perfect shows varied interactions with temporal adverbials. While the data are complex, the most important facts concern whether the present perfect is compatible with an adverbial referring to a definite time in the past, present, or future. In German, all three are possible (data from Musan 2001: 361).

- (20) a. Hans hat gestern den Brief geschrieben. (Past adverbial)
Hans has yesterday the letter written
'Has wrote the letter yesterday.'
- b. Hans hat jetzt den Brief geschrieben. (Present adverbial)
Hans has now the letter written
'Has has now written the letter.'
- c. Hans hat morgen den Brief geschrieben. (Future adverbial)
Hans has tomorrow the letter written
'Hans will have written the letter tomorrow.'

In English, only a present adverbial is possible. In Italian, either a past or present adverbial is possible, but not a future adverbial. In Swedish, either a present or future adverbial is possible, but not a past adverbial (so long as we set aside a separate inferential use of the Swedish perfect form, see Rothstein 2008).

It is generally assumed that the possibility of having a future adverbial with the present perfect in a given language is dependent on the semantics of the present tense in that language. Thus, German fairly easily allows future time reference with the present tense, as seen in (21a), and Musan argues that this fact immediately accounts for (20c). In English, future time reference with the present tense is more restricted; example (21b) is only possible if there is a definite plan or schedule for John to leave:

- (21) a. Im Juni hat Maria Ferien. (Musan 2001: 372)
in-the June has Maria vacation
'Maria will vacation in June.'
- b. John leaves tomorrow.
- c. *John has left tomorrow.

From Musan's perspective, one would probably say that (21c) is ungrammatical because the "planning" interpretation of the present tense is not compatible with the perfect, but as far as I know, it has never been carefully explained why this should be so.

Past temporal adverbials are incompatible with the present perfect in English and other languages, as in (22a), a fact which has been important in the development of theories of the perfect. This incompatibility is known as **the present perfect puzzle**, and its puzzling nature is made clear by two facts. First, note that (22b), lacking the adverbial, can be true if Mary arrived yesterday; this shows that the problem with (22a) is not with the temporal relations described, but with how they are described.

- (22)
- a. *Mary has arrived yesterday.
 - b. Mary has arrived.
 - c. In the event my Lord, erm, that er your Lordship felt that further guidance was required, there are the two routes that I've *indicated* to your Lordship briefly *yesterday*, [. . .]
 - d. *I have enjoyed yesterday's party.
 - e. *Mary has arrived on yesterday's flight.
 - f. #Mary has enjoyed that party.
 - g. Mary has seen yesterday's visitor.

Schaden (2009) argues that combinations like (22a) are in fact possible, as in (22c) (his (13c)), but the attested examples which he provides are all representative of very formal contexts. A correct account will need allow for such sentences in a particular dialect or register, but also to explain their ungrammaticality elsewhere. I don't think it's been noticed before that the same phenomenon sometimes occurs when past time reference is implied by an argument, as in (22d), and non-temporal adverbials, as in (22e), when they entail the same kind of time restriction as a temporal adverbial would. Example (22f) is also unacceptable in a context where *that party* refers to the particular party which is known to have taken place yesterday, but is acceptable if it refers to a recurring weekly event. (22g) shows that the restriction in (22e) is not syntactic; it is acceptable because *yesterday's visitor* does not restrict the time at which Mary saw the person, unlike *yesterday's party* in (22d), where the enjoyment had to be yesterday if the party was.

Second, sentences parallel to (22a) in the past perfect or tenseless perfects are acceptable, as pointed out by McCawley (1971):

- (23)
- a. Mary had arrived the day before.
 - b. Having arrived yesterday, Mary is well-rested for the race.

The contrast between the present perfect, on the one hand, and past/tenseless perfects on the other, leads several linguists to conclude that present perfect puzzle crucially involves the analysis of the present tense (e.g., Giorgi & Pianesi 1997, Portner 2003, Pancheva & von Stechow 2004, Rothstein 2008, but Schaden 2009 argues against this conclusion); thus, according to this view, the difference between a language like German, with no present perfect puzzle, and a language like English, concerns the syntax and/or semantics of the present tense. We'll return to the analysis of the present perfect puzzle in Section 2.2.

Another interaction between the perfect and adverbials is noted by Spejewski (1997):

- (24) a Has Kay paid her bills this month.
b ??Has Kay paid her bills this week/today?

Assuming that bills typically must be paid on a monthly basis, *this week* is strange. This pattern contrasts with the simple past:

- (25) Did Kay pay her bills this month/this week/today?

The version of (25) with *this month* can have an interpretation very close to (24), indicating that the speaker wants to know if Kay is up to date with her bills. What's important is that, in contrast to the case with the perfect, the other adverbials are also perfectly acceptable, and simply indicate that the speaker is asking the question for another reason. For example, *Did Kay pay her bills today?* could be asked because the speaker wants to know whether Kay has finally gotten around to paying her bills, or wishes to know whether she has received the loan she needed to get through some hard financial times. The key point shown by (24b) is that such an interpretation is not readily available with the perfect.

2.1.3 Variability of nature of current relevance

It is generally assumed that a present perfect sentence says something both about the past, and about the present. On this view, the meaning of (22b) involves both Mary's arrival, which is past, and something about the present, connected to Mary's arrival. The problem is that it is difficult to pin down the nature of this "current relevance" in a way which is both explicit and able to account for the full range of data. This difficulty has led some (e.g., von Stechow 2002) to argue explicitly for a high level of ambiguity in the perfect construction. However, others continue to pursue a unified analysis. One of the reasons it is so difficult to decide whether the perfect is ambiguous or not is that the current relevance of this form is quite difficult to pin down; there is no simple data illustrating relevance on a par with the temporal data given above in Sections 2.1.1-2.1.2. Since most of the data concerning relevance has arisen by way of providing motivation for one or the other of the theories of the perfect, it will prove useful to introduce the primary and some of the secondary analyses of the perfect in this section.

One way to think about current relevance is to insist that the time indicated by the sentence's tense plays a distinguished pragmatic role in the interpretation of the sentence. We can label this analysis the **indefinite past** view of the perfect, the idea being that the sentence describes an event in the past, but without giving any particular importance to the time at which this past event occurred. Rather, what's important is the time marked by the tense. For example, in the case of (22b), we describe Mary's arrival, but do not portray the moment of arrival as especially important; rather, by virtue of using the present tense, we treat the moment of speech as important. Section 2.2.1 will discuss the indefinite past approach.

Example (22b) also offers motivation for another way of understanding current relevance. It would be natural to use this sentence if we want to say not only that Mary arrived, but

also that she is still here. We can integrate this ways of viewing matters into the semantics by saying that the perfect introduces a **perfect state**, holding at the time indicated by the sentence's tense, linked in some way to the past event. Thus in (22b), the perfect state might be the state of Mary being here. Various approaches to the link between past event and perfect state will be discussed in Section 2.2.2. What is relevant to observe now is that, while it is easy to focus on the state of Mary's being here in example (22b), in other examples it is more difficult to identify the current relevance of the perfect with a particular state.

- (26) a. The ghost has ceased to exist.
b. I have climbed all three of those mountains.
c. The Earth has been hit by giant asteroids before (and it probably will be again). (Portner 2003: 459)

Example (26a) does not report any current state of the ghost, since the ghost does not exist. If it reports any kind of state at all, presumably it is a state of the world as a whole, that of not containing the ghost in question. In order for (26b) to be appropriate, I do not have to be on top of all three mountains; nor do I have to be lacking toes due to frostbite or basking in fame. (26c) is similar to (26a); the asteroids need no longer exist, and the earth needs show no signs of the impacts.

Data such as these has led other scholars to propose that current relevance is to be explained in terms of temporal relations. The basic idea of such **extended now** theories, and their descendents, is that the past event must have taken place not too long ago, where what counts as not too long ago is variable and pragmatically determined. The data in (26) is obviously relevant to evaluating this approach as well, since these sentence involve a wide variety of temporal relations between past event and speech time: in (26a), just a few moments, in (26b), perhaps 50 years, and in (26c), at least millions of years. According to the extended now approach, these differences would have to be attributable to pragmatic factors.

A classic argument in favor of the extended now approach is example (27), from McCoard (1978):

- (27) ??Gutenberg has discovered the art of printing.

The idea is that in any conversation in which we can easily imagine (27) being used, Gutenberg's discovery is too long ago to satisfy the temporal requirement of the perfect. The difference between (26) and (27) must be derived from the pragmatic underpinnings of the notion of extended now. As further evidence for the pragmatically-determined nature of the extended now, Portner (2003) points out that (27) can be made acceptable in the right context (i.e., a demon who has directed the development of information technology says *Now that Gutenberg has discovered printing and Berners-Lee has invented the world wide web, it's time to lead these humans to the next thing*) We will discuss extended now theories in Section 2.2.3.

Several other types of data are relevant to our understanding of the nature of current relevance. First, we have the pattern noted in (24). This is intuitively a relevance effect, since the problem with (24b) seems to be that the extra information provided by *this week*, as opposed to *this month*, is not relevant to the assumed point of the utterance, that Mary is up to date with her bills. These examples seem to show that the current relevance of the perfect cannot be explained strictly in terms of events and states, since an event of Mary paying her bills last week, leading to her being currently up to date with her bills, could be truthfully described by the acceptable (24a). In other words, the information provided by the adverb, not just the identification of an event consistent with the adverb, is crucial.

Another type of data relevant to understanding relevance is the contrast in (28), observed by Chomsky (1970):

- (28) a. ?Einstein has visited Princeton.
b. Princeton has been visited by Einstein.

This contrast, known as the **lifetime effect**, shows that it is often strange to use a sentence in the present perfect when the subject is no longer alive. Several authors have drawn a link between the lifetime effect and current relevance (Inoue 1979, Smith 1992, Portner 2003). It has been noted many times that lifetime effects are heavily dependent on intonation and context (Inoue, Portner), and that they do not arise to the same extent across languages (Musan 2002).

Portner (2003) cites the sequence in (29) as demonstrating the importance of current relevance in the interpretation of the perfect:

- (29) (i) Mary has lived in London for five years. (ii) ??She has become ill.

The second sentence here is quite odd, and the reason seems to be that the event of her becoming ill is presented not as particularly connected to the present, but rather as part of a narration about the past. The example becomes acceptable if it is understood in a context where (29ii) can be seen as relevant, for example if it has been found out that certain toxins were released in London during the past five years, and we wish to give special medicine to anyone who became ill there during that time.

This diversity of data which is intuitively connected to a current relevance requirement of the perfect has led some scholars to the claim that it cannot be entirely accounted for in terms of any of the primary theories mentioned above. As a result, secondary analyses have been developed with the goal of accounting for some or all of the relevance facts. The first such analysis is the **informational relevance** approach to current relevance. Informational relevance theories aim to understand the perfect's current relevance in terms of the flow of information in conversation, relying in particular on the notion of discourse topic. According to this way of thinking, for example, (26b) might be used as a response to a suggestion that we climb Mt. A, Mt. B, or Mt. C. (The intended message

might be "let's pick another mountain.") Section 2.3.2 will discuss informational relevance.

The other secondary analysis of relevance argues that the perfect conveys **repeatability**. Example (26c) would, on this perspective, provide a prime example of the use of the perfect: the past event of asteroids falling is relevant in the clear sense that a similar event might happen again. The unacceptability of (27) would be easy to explain on this analysis as well, though the contexts in which it is acceptable would then pose a problem. Example (28) shows that, if repeatability is correct, exactly what must be repeatable is dependent on the structure or intonation of the sentence. We will discuss repeatability in Section 2.3.3.

2.2 Primary theories of the perfect

There are three major primary theories of the perfect, approaches which aim to explain the core temporal semantics of the form (some kind of pastness, or temporal anteriority), as well as some or all of the other semantic properties outlined in Section 2.1. This section will provide an outline of each such primary theory.

2.2.1 Indefinite past theories

Indefinite past theories are based on the idea that the specific details of the event or state which the sentence describes are in some respect not especially important. Consider (1), repeated here.

(1) Ben has fallen asleep.

It might be that the specific time at which Ben fell asleep is not very important, or what happened before or after is not very important. Rather, in perfect sentences, something about the time indicated by the sentence's tense is more important. In (1), we're relatively more interested in something which is true at the speech time. Versions of this approach have been developed by Reichenbach (1947), Montague (1973), Inoue (1979), Klein (1992, 1994, 2000), Giorgi & Pianesi (1998), and Katz (2003). (We might classify the ideas of Stump 1985 as an indefinite past theory or as an extended now theory. See below.)

There are various ways one can go about making precise this intuition that the event or state described by the main clause is relatively unimportant. For example, we might refer directly to the time indicated by the sentence's tense, but existentially bind a variable tied to the underlying event or state:

(30) $\exists e[e < t \ \& \ t = \text{now} \ \& \ \text{Ben falls asleep at } e]$

The idea here would be similar to the observation that *He saw a cat* and *A cat saw him* are more likely to be "about" him than the cat. This way of thinking may be the

motivation for Montague's rather programmatic analysis. In this simple form, however, it seems not to provide a basis for explaining the key facts outlined in Section 2.1.

From Reichenbach's early work, the literature has inherited some useful terms: speech time (S, the time at which a sentence counts as being produced, for semantic purposes), event time (E, the time of the event or state described by the core clause under the scope of tense, aspect, and modality operators), and reference time (R, the time described by the sentence tense, when tense is present). Within this framework, Reichenbach proposes the following relations:

<u>Present tense</u> R coincides with S (abbreviated S,R or S=R)	<u>Past tense</u> R precedes S (R_S or R<S)	<u>Future tense</u> R follows S (S_R or S<R)
<u>Perfect aspect</u> E precedes R (E_R or E<R)	<u>No perfect aspect</u> E coincides with R (E,R or E=R)	

Given these relations, a present perfect sentence has E_R, S (i.e., $E < R$ and $R = S$). Klein replaces S, R, and E with TU ("time of utterance"), TT ("topic time"), and TSit ("time of situation"), respectively. While TU and TSit are just new labels, using TT adds an important ingredient to the indefinite past theory: As suggested by the word "topic", TT is described as the time about which a claim is being made; in the perfect, TSit is distinct from TT, and thus TSit is not the time about which a claim is being made. In contrast, in the simple past, where TSit and TT coincide, a claim is being made about TSit, or at least the part of TSit which is simultaneous with TT.

Based on the core ideas of the indefinite past theory, Klein proposes an explanation for the fact that the present perfect cannot occur with definite past adverbials (see (22a)). Following the intuition that TSit (i.e., E) is indefinite and less important than TT (i.e., R) in the perfect, he proposes a constraint to the effect that both TT and TSit cannot receive a definite temporal specification in a given perfect sentence. In the present perfect, TT coincides with TU, and so is definite, and thus TSit cannot be. This implies that it cannot be constrained by a definite temporal adverbial like *yesterday*. In order to explain the contrast with past perfects, where (23a) is acceptable, he would have to assume that the past tense is not definite; such an assumption is difficult to maintain, given the pronoun-like nature of the past tense (Partee 1984; see article 57 (Ogihara) *Tense*).

Indefinite past theories have difficulties explaining the continuative/non-continuative contrast. Since they treat the continuative (universal) reading as a special case of the non-continuative (existential) one, they run into Mittwoch's problem discussed above. Moreover, they are unable to explain the link between continuative readings and aspectual class, namely the fact that (in some languages at least) the continuative reading is only possible when the clause under the scope of the perfect is stative. And finally, those versions of the approach will follow closely Reichenbach's system in linking the

perfect to an E<R relation (such as Klein's and Giorgi & Pianesi's) seem unable to express the continuative meaning with certain adverbials. The following data is from Portner (2003):

- (31) a. Mary has lived in London for five years.
b. Mary has lived in London since 1966.

Klein argues that E in (31a) is not Mary's entire time in London, but rather just the five-year-long subevent of it described by *Mary lived in London for five years*. This subevent is entirely past, and so the E<R (TSit<TT) relation is maintained; if it happens to be pragmatically suggested that the entire event (not the subevent) extends up to the speech time, we have the continuative reading. As pointed out by Kuhn & Portner (1997), however, such an analysis is not possible for (31b).

In its simple form, unaided by secondary components of meaning, the indefinite past theory seems unable to explain much of the other data outlined in Section 2.1. In particular, it does not address the adverbial data (except for Klein's proposal, discussed above) or the data which seem to reflect a requirement of current relevance. Because of this weakness of the core indefinite past theory, its proponents have been motivated to explore secondary components of meaning which might explain the facts. Indeed, several of the most important discussions of secondary components took place in the context of the indefinite past theory: Giorgi & Pianesi argue that the morphosyntax and semantics of the present tense is crucial to explaining some of the adverbial data (Sect. 2.3.1). Inoue gives the first account of informational relevance (see Sect. 2.3.2). Stump proposes that a markedness relation exists between the perfect and the simple past (see Sect. 2.3.4). And Katz proposes that the event type must be repeatable in a particular sense (Sect. 2.3.3). We will discuss the work which these proposals are designed to do below.

2.2.2 Perfect state theories

According to the perfect state approach, the meaning of the perfect is to be represented in terms of a state which holds at the time indicated by the sentence's tense. For example, on this view (22b) might indicate that Mary is currently still "here", i.e., at the location where she arrived. In this case, the state in question can be described as a result of the past event of Mary's arrival. As we have seen Section 2.1.3, however, not all perfects can easily be described in terms of a state which is literally the result of a past event described by the sentence, and so a more general concept is in order: the perfect state. This view is supported by many scholars (e.g., Moens & Steedman 1988, Parsons 1990, Kamp & Reyle 1993, ter Meulen 1995, Spejewski 1997, Smith 1992, de Swart 1998, Musan 2001, Nishiyama & Koenig 2004, Schaden 2009), and has many variants, sketched below in S1-S4, depending on the nature of the link proposed between the past event and the current state:

- S1. The perfect state is a result of, or contingent upon, the past eventuality (Moens & Steedman 1988, Smith 1992, Spejewski 1997). We can describe this version of the perfect state approach as the Result State analysis.

- S2. The relation between the past event and the current state is temporal, with the state beginning during the event or as it ends (Kamp & Reyle 1993, de Swart 1998).
- S3. The perfect state is a special kind of "resultant state" (Parsons 1990, ter Meulen 1995, Musan 2001). The resultant state is to be distinguished from a result state. A resultant state is not an ordinary state which has been caused by the past event described by the sentence, but rather a kind of abstract state of the event's "having occurred".
- S4. There are no semantic constraints on the identity of the perfect state (Nishiyama & Koenig 2004, Nishiyama 2006, Schaden 2009).

Many of these theories also assume that pragmatics is essential to identifying the perfect state, in particular those falling under S1 and S4. S1 requires such a pragmatic addendum because there will be typically many current results of any past event. Thus, if the only constraint on the use of the present perfect were that it have some current result, the perfect would virtually always be true whenever the past event described did in fact occur; in other words, it would be virtually equivalent to the past. Without a pragmatic addendum, S4 will also be equivalent to the statement that the event described by the sentence occurred. Of course, this is not a correct consequence; the data in Section 2.1 show that the perfect is not interchangeable with the past. Thus some pragmatic constraint is required. Though most of the theories under discussion have not included a detailed account of the pragmatic constraint, Nishiyama (2006) makes a specific proposal, namely that the identity of the result state is inferred by Gricean pragmatic mechanisms, in particular Levinson's (2000) I-Principle.

Perfect state theories have difficulty with relevance phenomena, such as the Gutenberg example (27). Gutenberg's discovery of printing has current results (and so a fortiori it has a resultant state) which are readily inferable. Nishiyama & Koenig argue that in it will never make sense to mention both the past event and the current result of this sentence in a particular context, but this does not seem to be so. (*"What contributions have Germans made which are still important to the German economy today?" -- "Gutenberg discovered printing, which is the basis of our world-renowned academic handbook industry."*) More to the point, inferability using Gricean principles is supposed to be the pragmatic constraint in Nishiyama & Koenig's analysis, and so appealing to another constraint just means that the main proposed is either incomplete or incorrect. In fact, when we look at Nishiyama & Koenig's suggestion in detail, we actually find them appealing to the notion of discourse topic, i.e. informational relevance. Schaden (2009) takes another approach, suggesting an explanation for this type of relevance phenomena based on competition; see Section 2.3.4 below.

Similar points can be made concerning the other relevance phenomena mentioned in Section 2.1.3. For example, lifetime effects do not follow from the proposal that the perfect indicate the existence of a current state, so some additional pragmatic constraint is necessary. It is fair to conclude that the core Perfect State theory cannot explain the current relevance of the perfect, and some secondary analysis will be necessary.

Perfect State theories typically consider the continuative perfect to be a pragmatically determined subcase of the non-continuative perfect. Thus they run into Mittwoch's problem, described above. They also have difficulties explaining the grammatical restrictions on continuative readings, such as the relevance of adverbial position and aspectual class (Section 2.1.1). Musan (2001) offers an explanation for the role of aspectual class; in particular, she argues that achievement and accomplishment predicates do not allow continuative perfects because the perfect requires a "truth interval" to hold before the reference time. That is, in (32a) requires that there be a past interval in which "Noah be sick" is true; this is compatible with him still being sick. However, turning to (32a), if there is a past interval at which "Noah builds a plane" is true, he can't still be building it. Musan's explanation does not extend to (non-progressive) activity predicates like that in (32c), though as noted in Section 2.1.1, this is not a difficulty for German, where the simple past of activity predicates can cover the meaning expressed by the progressive in English.

- (32) a. Noah has been sick. (continuative reading ok)
 b. Noah has built a plane. (no continuative reading)
 c. Noah has run. (no continuative reading)

Finally let us turn to how Perfect State theories explain some of the adverbial data given in 2.1.2. As pointed out by Portner (1997), examples like (24b) are problematical: an event of Mary paying her bills this week would result in an (inferable) state of her being up-to-date with her bills, so the sentence should be an acceptable way to find out if she's up-to-date. One might imagine Nishiyama and Koenig objecting that the speaker is asking for more information than is necessary, since simply asserting that she paid her bills within the last month would be sufficient to imply this current state, but Gricean principles do not seem to be sufficient to explain the unacceptability of (24b). Recall that the simple past sentence (25) is acceptable, and can be used to find out about other current states, such as whether she's well enough to pay bills. A Gricean theory like Nishiyama & Koenig's predicts that (24b) should be acceptable and have such a function.

The present perfect puzzle is also difficult for the Perfect State theory. One might be tempted to propose that temporal adverbials always restrict E (i.e., TSit), not R (TT), but this is not correct, as we see with past perfects (data from Portner 2003):

- (33) a. On Tuesday I learned that Mary had arrived two days before.
 b. Mary has arrived only recently.

In (33a) *two days before* describes the event time, not the reference time. In order to deal with the incompatibility of the present perfect with past adverbials in certain languages like English, the Perfect State theories will have to appeal to secondary features of meaning. In this vein, Schaden makes a proposal based on competition between the present perfect and simple past forms. See Section 2.3.4 for discussion of his theory. As noted above, he cites data like (22c) in support of this view that the combination of present perfect and past adverbial is not in general ruled out in English, but rather is possible only when the choice of the perfect form is pragmatically justified. He does not

explain why such combinations are restricted to a particular register or variety of English. According to the competition view, we would expect them to be generally available when the pragmatic conditions are met, e.g., for (22a) to be acceptable when it's relevant both that Mary's arrival was yesterday and that she's still here today. This is not correct; the sentence is unacceptable in such contexts:

- (34) A: We'd like a first-hand report of the incident which took place on yesterday's flight. Are any of the people who came on that flight still around?
B: *Yes, Mary has arrived yesterday.

2.2.3 Extended now theories

The central idea of extended now theories is that the perfect indicates that the event described by the clause under the scope of the perfect occurred within a restricted interval of time. According to classical version of this view, such as that of McCoard (1978), this interval ends with the speech time (more generally, the time indicated by the sentence's tense) but extends it into the past. Thus, (1) would say that Ben's falling asleep occurred within an interval of time which ends with the speech time. The initial point of the extended now can be determine by adverbials, implied by context, or left vague.

More recently, the literature has suggested other ideas about the relationship between the extended now and the speech time. One perspective is that it does not include but speech time, but rather abuts it (Spejewski 1998, Rathert 2003); another is that it may properly precede, abut, or include the speech time -- i.e., just that no part of the extended now follows the speech time (Stump 1985, Pancheva & von Stechow 2004, Rothstein 2008). Because it is not always assumed that the interval in question actually contains the speech time, many scholars speak of the **perfect time span** rather than the extended now. In order to determine when the perfect time span ends, we can look at the compatibility of the present perfect with certain adverbials. For example, the behavior of German *immer* ('always') is revealing. Rothstein (2008) notes that in (35) the time during which the speaker lived in Berlin must properly precede the speech time:

- (35) Ich habe immer in Berlin gewohnt, bis ich nach Tübingen gezogen bin.
I have always in Berlin lived until I to Tübingen moved am
'I always lived in Berlin, until I moved to Tübingen.'

Assuming that *immer* entails that the situation described by the predicate occupies the entire extended now, these data show that the extended now can entirely precede the speech time. As pointed out by Rothstein, the pattern in (35) is impossible in English (**I have always lived in Washington, but then I moved to Boston*), a fact which suggests that the precise characterization of the perfect time span must differ from language to language.

Scholars working with the extended now tradition have done important work on the continuative/non-continuative distinction. Building on the work of Dowty (1979) and

Mittwoch (1988), von Stechow (2002), Iatridou et al. (2003) and Pancheva & von Stechow (2004) propose that those adverbials which can license the continuative reading are ambiguous. On one interpretation, they introduce a universal quantifier over times, and this leads to the continuative reading; on another, they introduce an existential quantifier, producing the non-continuative reading. For example, in (12a), repeated below, John is sick at all times during the several-days-long extended now. By contrast, in (13a), he is asleep at some time during the (unspecified) extended now.

(12) a. John has been sick for several days.

(13) a. John has slept.

Iatridou et al. connect this difference to the fact that continuative readings are only possible with stative predicates (though they argue that stativity is not precisely the right concept). It is of course not ideal to propose a lexical ambiguity to account for the continuative/non-continuative contrast. More importantly, I do not know of a compositional proposal which works these ideas out in detail (though see Dowty's, Mittwoch's, and von Stechow's work for partial analyses).

Rathert (2003) rejects the ambiguity approach to the continuative/non-continuative contrast. To some extent, it appears that her analysis is based on scope, but this analysis is only applied to adverbials like *until* which themselves indicate the end of an interval. For example, the continuative reading of her example (36) amounts to the existential reading "there is an interval *i* during the perfect time span, and there is an interval *j* during *i*, which ends yesterday, and he runs at *j*". (On the existential reading, *bis gestern* would modify *i*, rather than *j*.)

(36) Er ist bis gestern gerannt.
He is until yesterday run
'He ran until yesterday.'

Assuming that the perfect time span ends yesterday (rather than the speech time, as it would have to in English), this amounts to a continuative reading; but in a way, this reading is a pure accident, derived only because the adverbial happens to refer to the time which is also the end of the perfect time span. If the perfect time span extended until today, the adverbial in (36) would be interpreted in the same way, but we would not call it a continuative reading. Note that this analysis cannot apply to adverbials which do not indicate the end of an interval, since such adverbials cannot be used to say that the core event reaches the end of the perfect time span. In such cases, she appears to treat the continuative reading as a special case of the existential one. Thus, Rathert runs into Mittwoch's problem and cannot explain why continuative readings are affected by adverb position and aspectual class. Of course, this is partially to be expected, since as pointed out in Sect. 2.1.1, she argues that adverb position is irrelevant.

The extended now theory has little to say about the present perfect puzzle. While in its classic form, the theory predicts that past adverbials are unable to modify the extended now (since the extended now includes the speech time), past adverbials should be

acceptable when they modify the event time, as we know they can from (33). As a result, scholars have turned to various secondary components of meaning to explain the present perfect puzzle: Rothstein invokes a syntactic relation between the tense and adverbials (Sect. 2.3.1), Iatridou (2003) suggests that repeatability is responsible (Sect. 2.3.3), and Pancheva & von Stechow explain the puzzle using a competition approach (Sect. 2.3.4).

The extended now approach aims to explain relevance phenomena in terms of the pragmatic significance of the extended now. The idea is that by indicating that an event is in the extended now, the speaker signals that the time at which it occurred is relevantly like the speech time. Thus, (26a) implies that the ghost is gone because the time when it vanished is not relevantly different from now, (26c) implies that asteroids could strike earth again, and (27) is odd because it's hard to think of a context in which the time of Gutenberg's discovery would be considered one with the speech time. Example (29) is a problem, however, since (29i) seems to indicate that the extended now is five years long, and since the event in (29ii) falls within this time span, it should be acceptable. In other words, (29) suggests that relevance cannot be understood solely in temporal terms, though the temporal approach may be one part of a broader conception.

2.3 Secondary components of meaning

2.3.1 The role of the present tense

Given that the present perfect puzzle only occurs (in languages where it occurs at all) in the present perfect, and not in past, future, or tenseless perfects, one natural suggestion is that the grammar of the present tense is crucially involved in its explanation. We find several analyses along these lines: Portner (2003) proposes that the present tense carries a presupposition that the main event described by the sentence occurs within the extended now (and thus this theory is similar to extended now approaches to the perfect, except that the extended now is associated with the present tense). Pancheva & von Stechow (2004) propose that the present tense in English requires that the event time coincide with the speech time, while the present tense in German allows the event time to partially or completely follow the speech time; this distinction feeds into a competition-based analysis of the present perfect puzzle (see Sect. 2.3.4 below). Giorgi & Pianesi (1997) and Rothstein (2008) propose a syntactic account whereby the English perfect auxiliary places a restriction on the kinds of adverbials which may occur in the sentence. The two differ slightly in how they explain the lack of present perfect puzzle in Italian and German: Giorgi & Pianesi claim that such languages lack the present tense altogether (so that so-called present tense sentences are actually tenseless), while Rothstein argues that in German the auxiliary is too low to place a restriction on the kinds of adverbials which may occur. Schaden (2009) points out that it is difficult to extend Rothstein's assumption about the position of the auxiliary to Romance languages. Moreover, the syntactic account will have difficulties explaining why the present perfect puzzle also occurs with other varieties of adverbials and with arguments, as in (22d-e), and especially in the case where there is no explicit temporal expression, as in (22f).

Rothstein, and following him Schaden (2009), argues that analyses of the present perfect puzzle based on the semantics or pragmatics of the present tense on the grounds that we

would expect the meanings of present tense sentences to be alike in languages which show the puzzle, and different from languages which do not. In this context, he points out that the Swedish present tense is like that in German in readily allowing reference to future events and to ongoing present events. In all of these respects, Swedish differs from English:

- (37) a. I morgon reser jag till London. (Swedish)
tomorrow go I to London
b. Morgen reise ich nach London. (German)
tomorrow go I to London
c. #Tomorrow I go to London. (plan interpretation only)
d. Han sover. (Swedish)
he sleeps
e. Er schläft. (German)
he sleeps
f. #He sleeps. (habitual interpretation only)

(The (37a, 37b, 37d, 37e) examples are from Rothstein 2008.) Despite the similarity between the present tenses of Swedish and German, the former shows the present perfect puzzle, while the latter does not.

While the data in (37) is problematical for Pancheva & von Stechow's version of the idea that the present tense is responsible for the present perfect puzzle, it is not relevant to Giorgi & Pianesi's proposal (or to Portner's, since he follows Giorgi & Pianesi in this respect). According to Giorgi & Pianesi, the facts in (37) are not due to the semantics of the present tense, but rather to the aspectual semantics of the verbs. In particular, they propose that verbs in English are obligatorily perfective, and in combination with the semantics of the present tense, this rules out the relevant interpretations of (37c) and (37f); in Swedish, German, and Italian, the verb is not obligatorily perfective, and so the uses in (37) are possible.

2.3.2 Informational relevance

Inoue (1979) and Portner (2003) argue the relevance meaning of the perfect is to indicate that the proposition expressed plays a particular role in the discourse. More precisely, both argue that the sentence must be closely related to the discourse topic. For example, Inoue brings out the problem of explaining the current relevance of *Einstein has visited Princeton* in (38):

- (38) A: Which Nobel Laureates have visited Princeton?
B: Let's see, Einstein has (visited Princeton), Friedman has,

This example poses an interesting problem, in that it illustrates an exception to the lifetime effect, and thus a problem for any analysis of relevance which is based on the subject having a certain property at the reference time. Rather, according to Inoue, A's

utterance sets of a topic, and the sentence *Einstein has visited Princeton* is relevant to this topic.

While Inoue's way of working the concepts of topic and relevance to a topic do not work (see Portner 2003 for discussion), Portner reformulates it in more precise and modern terms. Following the hypothesis that a discourse topic can be represented as an open question (e.g., von Stechow 1994, Roberts 1996, Büring 1997, McNally 1997), we can say that in (38) the topic is given explicitly by A's question. In this context, *Einstein has visited Princeton* is relevant because it helps to answer the question. We can call this secondary component of meaning "informational relevance" in the sense that the perfect is required to provide information which is strongly relevant to the discourse topic.

Two points remain to be clarified about the nature of discourse relevance. First, we need to better understand the nature of the relevance requirement. Portner considers it to be a presupposition, but Nishiyama & Koenig dispute this characterization. And second (and closely related to the first) we need to be more clear about how the relevance requirement of the perfect distinguishes it from the simple past. Portner makes the point that the simple past can easily be used as part of a narrative, and that each sentence of a narrative does not need to be individually relevant in the strong sense of answering the discourse topic (rather, it's felicitous for the narrative as a whole to answer the discourse topic); in contrast, the perfect cannot be used in this way. These considerations point to the need to develop the idea of informational relevance in tandem with research on topics, and on discourse semantics more generally.

2.3.3 Repeatability

The present perfect puzzle has also been explained in terms of the idea that the kind of event described by the sentence must be repeatable. That is, (1) would require that it be possible for Ben to fall asleep again, and (22a) would be unacceptable because it is impossible for Mary to arrive yesterday again. Iatridou (2003) connects repeatability to the intriguing idea that the perfect creates a kind of existential sentence having to do with events, drawing a parallel between (39a-b):

- (39) a. There are there dogs outside.
b. Mary has smiled three times this week.
(\approx "There are three smiling events by Mary so far this week.")

On this view, the present perfect puzzle is parallel to the definiteness effect of (40a), since the adverbial (e.g., in (40b)) causes the sentence to describe a definite event:

- (40) a. *There is the dog outside.
b. *Mary has smiled yesterday.

Iatridou's perspective also suggests a way of thinking of an exception to the present perfect puzzle noted by McCoard, namely that past adverbial are possible in a list (data from Pancheva & von Stechow 2003). Lists also allow exceptions to the definiteness effect with *there* sentences:

- (41) a. Do we have pets? There's Shelby, Fluffy, and the bird.
b. John has played golf on Tuesday and ridden horseback on Wednesday.

Despite these advantages, Iatridou does not discuss obvious problems for repeatability. First, no explanation is provided for the absence of adverbial restrictions outside of the present perfect; and second, she does not discuss non-repeatable predicates like (42):

- (42) The dog has died.

Obviously, an individual's death is unique, and so (42) should pattern with (40).

Katz (2003) develops a more refined version of repeatability which is designed to handle examples like (42). According to him, the perfect presupposes that an event might occur in the future. Thus, (42) is acceptable, because we didn't know that the dog would die today; it might have died tomorrow. Katz also explains the lifetime effect seen in (28a) by noting that it is not considered possible that Einstein visits Princeton in the future. Where lifetime effects do not occur, as in (28b) and Inoue's (38), he appeals to the effects of focus structure on the presupposition. He argues that, because *Einstein* is focused, the presupposition of the perfect in this case does not involve Einstein; rather, it presupposes that some relevant individual (i.e., some Nobel Laureate) might visit Princeton in the future. While he does not explain how the presupposition is calculated, it should be possible to achieve the desired results in terms of focus semantics.

The lack of phenomena parallel to the present perfect puzzle in the non-present perfects is problematical for Katz, though he avoids the problem by taking the present perfect to be a single unit, in effect unrelated to the past perfect and other perfect forms. Another problem is that his analysis seems to predict that perfects like (43) are impossible:

- (43) It has been wonderful getting to know you this morning.

Apart from focus, the presupposition here should be that it might be wonderful getting to know you again in the future; this case is not like (42), in that at the time it's used, no one is presupposing that the speaker might get to know the addressee in the future. Focus on *getting to know you this morning* might solve the problem (leading to a presupposition that it might be wonderful in the future doing something relevant), but evidence would have to be provided that there really is focus in the relevant position. Moreover, some restrictions must be placed on the application of focus to the perfect's presupposition, since otherwise we'd expect to be able to rescue (22a) by focusing the adverbial or VP. More to the point, if focus can rescue (43), we'd expect it to be able to rescue (44) as well:

- (44) *It has been wonderful getting to know you yesterday.

2.3.4 Competition

Several scholars have proposed an analysis of the present perfect puzzle in English (and other languages which display the puzzle) which is based on the idea that there is a competition between the present perfect and the simple past (preterit) tense. The present perfect is argued to be a more marked construction than the simple past, and assuming this is so, we expect that the past should be used unless there is a reason to prefer the perfect. In this context, Stump (1985) provides an indefinite past semantics for the present perfect, and he shows that when this indefinite past meaning is combined with a temporal adverbial referring to a definite time in the past, the sentence is always equivalent to what would be expressed by a past tense sentence with the same adverbial. Hence, Stump argues, the present perfect cannot be used with such adverbials. For example the present perfect in (45a) would lead to a meaning equivalent to the corresponding sentence with the simple past, (45b):

- (45) a. *Mary has arrived yesterday.
b. Mary arrived yesterday.

Since (45a-b) convey the same meaning, according to Stump, there can be no justification for using the perfect. Pancheva & von Stechow (2004) build a similar analysis based on the extended now theory, and Schaden (2009) does likewise based on the perfect state approach.

These competition-based analyses of the present perfect puzzle explain the lack of similar phenomena in tenseless perfects and the past perfect (as seen in (23)) by the fact that there is no alternative form which could be in competition relation with these perfects. That is, there is no past tense in tenseless clauses, and there are no clauses containing two past tenses. Moreover, both Pancheva & von Stechow and Schaden propose that the present perfect puzzle is lacking in languages like German because the perfect and the past are not in the right kind of competition relation.

The various competition-based analyses differ in where they see the source of the competition between present perfect and past. Both Stump and Pancheva & von Stechow are tempted by pragmatic explanations which seem to be based on Gricean implicature. Stump points out that the perfect is morphologically more complex than the past, and so is more marked in these (Gricean "manner") terms. In addition, according to the semantic analyses provided both by Stump and by Pancheva & von Stechow, the present perfect in English is semantically less specific than (i.e., is entailed by) the past; hence, they claim, the past should be used unless there is a reason not to use it. More precisely, they suggest that, in English, the present perfect can only be used if the use of the past would lead to a false sentence. From this point, they make the same argument as Stump did: According to their semantic assumptions, the present perfect and the past are equivalent when combined with a definite past adverbial, and given this equivalence, the condition of use of the present perfect, namely that the use of the past is ruled out because it would lead to falsity, can never be met.

Neither Stump nor Pancheva & von Stechow are committed to a fully pragmatic account of the present perfect puzzle. Stump acknowledges that the markedness relation between the present perfect and past may have grammaticalized, and Pancheva & von Stechow think that something more than pure Gricean implicature must be involved (though they are open to the possibility that an appropriately grammatical analysis of scalar implicature may work: see article 87 (Chierchia et al.) *Grammatical view of scalar implicatures*). Schaden explicitly denies that the markedness relation between the present perfect and past can be derived from anything. Rather he argues that the fact that the present perfect is more marked in English is a primitive fact. This point is crucial to him because he makes the unique claim that in languages which do not display the present perfect puzzle, the markedness relation is reversed. That is, in languages like German, the past is more marked than the present perfect. (This is in contrast to Pancheva and von Stechow, who simply claim that there is no markedness relation between the two forms in German.) Schaden further argues that a number of other differences between the pasts and perfects in the two classes of languages follow from this difference in the markedness relation.

2.3.5 General principles of temporal interpretation

Portner (2003) argues that some features of the perfect's meaning should not be attributed to any element in the sentence, but rather to general principles of interpretation. In particular, he argues that the perfect itself does not have any temporal meaning -- it does not indicate indefinite past, result state, or extended now -- but rather only introduces a relevance requirement in the form indicated in Sect. 2.3.2. Any temporal meaning comes either from the sentence's tense (recall his hypothesis that there is an extended now requirement associated with the present tense), or from general principles.

In support of the idea that principles not specific to the perfect construction are involved, Portner points out the similarities between the continuative/non-continuative contrast and the interpretation of tenses in embedded clauses and in discourse. Just as continuative perfects are only possible with statives, as seen in (12)-(13), we find different interpretative possibilities for statives and non-statives in subordinate clauses:

- (45) a. Mary believed that John was sick/knew French.
 b. Mary believed that John died/ran a race.

Let us call the time at which Mary held these beliefs t_b . In (45a), Mary may have believed that John was sick at t_b , or that he was sick before t_b . The former is the "simultaneous" reading, and the latter the "shifted" reading. Example (45b) only has the shifted reading. See Abusch (1988, 1997), Ogihara (1989, 1995, article 57 (Ogihara) *Tense*) for discussion. A similar difference occurs in discourse, where non-statives move the time of narration forward, while statives typically do not (e.g., with some differences, Hinrichs 1982, Partee 1984, Kamp & Reyle 1993). Portner argues that the simultaneity observed in (45a) and with statives in narration is the same as that we see with continuative readings of the perfect, and attempts to characterize a general principle which can account for both.

It is certainly a rather surprising hypothesis that the perfect lacks a temporal semantics, and that this absence of temporal meaning explains the choice between continuative and non-continuative readings. Nevertheless, the parallels between the perfect and the interpretation of tense in embedded clauses and in narration do need to be explained somehow, even if a non-construction-specific principle of the kind he develops is ultimately not the right way. As far as I know, no specific arguments against Portner's approach to the continuative/non-continuative contrast have been offered in the literature.

2.4 Putting the perfect back together

Above I've emphasized the main components which have been used to assemble analyses of the perfect. Most analyses assume that the meaning of the perfect is to be explained in terms of one primary theory in combination with one or more secondary theories. Of course each such combination embodies a hypothesis about how the phenomena are to be divided up. Obviously analyses which make use of fewer independent meaning components are to be preferred, other things being equal. Thus an analysis which made use of just a primary theory would be ideal, if it could explain all of the facts (but unfortunately, it is probably impossible for such a theory to do so). Moreover, certain combinations of ideas should be seen as potentially redundant, and so to be dispreferred. For example, repeatability and informational relevance aim to explain similar groups of facts, and so it is unlikely that both will find a place in the correct analysis of the perfect in any single language. Assembling an account of the perfect out of these various pieces (and in some cases other pieces not mentioned here) is a delicate task.

Table 1 indicates how a number of important analyses of the perfect combine primary and secondary components. A name may occur in more than once cell, since a given theory may combine several secondary components.

Table 1: Classification of analyses of the perfect

		Primary Theories		
		Indefinite Past	Perfect State	Extended Now
Secondary Components	Present Tense	Giorgi/Pianesi		Portner , Pancheva/von Stechow, Rothstein
	Informational Relevance	Inoue		Portner
	Repeatability	Katz		Iatridou
	Competition		Schaden	Stump, Pancheva/von Stechow
	General principles			Portner
	None of the above; may appeal to ambiguity or pragmatic processes.	Klein	Parsons, Kamp/Reyle, Smith, de Swart, Musan, Nishiyama and Koenig	Mittwoch, Iatridou et al., von Stechow, Rathert

Though I hope that it will prove useful, one must be cautious about using a table like this for direct comparison of theories. First of all, I have had to make judgment calls about how to describe certain theories; for example, Musan discusses the role of the present tense in certain facts observed with the German present perfect, but since these facts are not typically seen as having to do with the perfect itself, I do not represent this aspect of her discussion in the table. More importantly, not all analyses are equally comprehensive in their attempts to explain the important phenomena; nor are they all equally detailed and precise. Thus, to take an instance, Nishiyama & Koenig's paper is very brief, and it is not much more than suggestive on certain crucial issues; as a result, it is difficult to know such things as whether they mean to appeal to informational relevance in invoking the notion of discourse topic. Because of limitations such as these, any summary (including this table, as well as this article as a whole) can best be used as a guide as one aims to develop a deeper understanding of each component idea, and as one attempts to understand and evaluate individual proposals.

3. The progressive

The progressive is a periphrastic grammatical form used to say that some event is in progress, or ongoing, at the time indicated by the sentence's tense. For example, (46) indicates that Mary's action of walking was ongoing at some point in the past.

(46) Mary was walking.

Because it is used in this way, the English *be+VERB-ing* form can be referred to as "the English progressive ". Other languages have similar periphrastic forms, though they have seldom been the specific subject of formal analysis.

In other instances, the term "progressive" is used to indicate a particular meaning or use of a grammatical form; for example, the Spanish imperfective (*imperfecto*) has among its many uses the ability to describe ongoing events (data from Cipria & Roberts 2000, (2b)):

- (47) Ibamos a la playa cuando nos encontramos con Miguel.
go-1plu.IMPF to the beach when RECP. meet-1plu.PRET with Miguel
'We were going to the beach when we ran into Miguel.'

The *imperfecto* can also express such other meanings as habituality and intention, and because of the variety of situations which may be described using the *imperfecto*, it would be confusing to call it, without qualification, "the Spanish progressive". Rather, we talk of a "progressive use" or "progressive meaning" of the *imperfecto*. In fact, a similar issue applies to the English progressive, given that it can be used to talk about a predicted future event.

- (48) Mary is leaving town tomorrow.

For these reasons, there is some lack of clarity in what is meant by providing an analysis of the progressive. We may be talking about a progressive form, with all of its meanings and uses, or the progressive meaning (approximately: the event is ongoing) of a form which is not limited to this meaning. In many instances, semanticists are implicitly striving for an ideal balance between these two perspectives, trying to identify a class of meanings which should be given the same theoretical analysis as the ongoing-event meaning, while excluding as altogether distinct other meanings which are often expressed by the same form. Here will mainly focus on the analysis of cases like (46) which have been taken to exemplify a core progressive meaning, although we will discuss briefly in Section 3.3 the prospects for providing a unified analysis of many or all of the uses of more wide-ranging forms like the Spanish *imperfecto*.

3.1 Outline of key data

As with the perfect, the literature on the progressive has identified a large amount of data relevant to its semantic analysis. In this section, I outline the key phenomena which must be attended to, but of course much has been left out as well (see Vlach 1981 in particular). This key data can be divided into two types: that having to do with the aspectual properties of sentences containing the progressive, and that which shows entailment patterns relating progressive sentences to their non-progressive counterparts.

3.1.1 Aspectual facts

In the literature on aspectual classes, it is often noted that stative sentences do not occur in the progressive (e.g., Vendler 1967, Taylor 1977, Dowty 1979, among others; see also article 48 (Filip) *Aspectual Class and Aktionsart*):

- (49) a. *She was knowing the answer.
b. *She was being tall.

Let us call this the **no-statives property**. Our description of this property must be qualified by two points. First, it only applies to statives which describe a more or less permanent situation, Carlson's (1977) individual-level predicates; thus, sentences like (50), based on the *John sit over there*, which is stative by some criteria, do allow the progressive:

- (50) John is sitting over there.

(See article 35 (Maienborn) *Event semantics* for relevant discussion.) And second, sometimes even individual level statives allow the progressive (cf. Partee 1977, Dowty 1979):

- (51) Finally, I'm understanding how to solve this problem.

Such examples are often seen as resulting from coercion, that is a meaning shift which allows the preconditions for compositional interpretation to be met. In the case of (51), coercion would give a different, non-stative sense to the ordinarily individual-level stative clause *I understand how to solve this problem*. On coercion, see, for example, Moens & Steedman (1988), de Swart (1998), article 25 (de Swart) *Mismatches and coercion*, and article 48 (Filip) *Aspectual class and Aktionsart* for further discussion.

A more subtle aspectual property of the progressive has been identified and discussed by Vlach (1981), Mittwoch (1988), Lascarides (1991), Hallman (2009), among others. Whatever the basic aspectual properties of the clause under the scope of the progressive, the progressive sentence itself entails that some process was ongoing at the time described by the sentence. Let us call this the **process property**. For example, in (52), the process in question is the one described by the activity sentence itself:

- (52) Mary was running for an hour.

This example entails that the activity of Mary's running was ongoing for the entire hour. Moreover, because processes are internally homogenous, for virtually any long-enough interval of time during that hour, a process of Mary running was ongoing at that interval as well. With some accomplishment sentences, like (53a), from Landman (1992), the process in question is lexically determined; with other accomplishments and achievements, the nature of the process is more varied, as illustrated in (53b-c):

- (53) a. Mary was building a house.
 b. Mary was realizing the answer.
 c. We are now arriving at our destination.

In (53a), the verb *build* indicates lexically the nature of the process which is described by the progressive sentence; it is a building process. As for (53b), while it normally takes but a moment to realize something, in this case it seems to take longer, long enough to count as a process. And while arriving somewhere is in principle an instantaneous change, in (53c) we focus on what is going on before the moment of arrival, and this yields an appropriate process which may be ongoing.

3.1.2 Completion and non-completion entailments

In certain cases, the present progressive form of a sentence entails its present perfect counterpart, while in other cases it does not (cf. Bennett & Partee 1972, Taylor 1977, among many others):

- (54) a. John is smiling. *entails* John has smiled.
 b. John is deciding what to do. *does not entail* John has decided what to do.

Over the years, the field has identified a number of such entailment patterns, typically with the goal of showing a counterexample to one theory or another. In this section, I will outline some of this data, but without describing the theoretical discussion it was part of.

The distinction in (54) has been described in terms of the subinterval property (Bennett & Partee 1972). An expression has the subinterval property iff, whenever it is true at an interval of time *i*, it is true of all (or more accurately, all long-enough) subintervals of *i*. (One can define related properties for semantic systems making use of events or situations, rather than temporal intervals.) For example, the untensed clause *John smile* has the subinterval property, since any subinterval of an interval in which he smiles is also one in which he smiles. In terms of the most well-known aspectual classes of sentences, activity/process and state sentences have the subinterval property, while accomplishment and achievement sentences lack it.

The examples in (54) illustrate that a past progressive sentence entails its perfect counterpart only if it is based on a clause with the subinterval property. Let us describe this entailment by saying that such perfect sentences have the **completion property**. Progressive sentences not based on clauses with the subinterval property lack the completion property. Similarly, they fail to entail their future tense (and future perfect) correlates, as seen in (55a), and their simple past tense and future perfect correlates, as in (55b):

- (55) a. John is deciding what to do. *does not entail* John will decide what to do/John will (eventually) have decided what to do.
 b. John was deciding what to do. *does not entail* John decided what to

do/John will (eventually) have decided what to do.)

It is easy to confuse the observation concerning the process property discussed in Section 3.1.1 with the subinterval property. The subinterval property has to do with expressions, specifically the expression which is put into the progressive form. In (54a) we see the progressive of an expression which has the subinterval property (*John smile*), while in (54b), we see the progressive of an expression which lacks the subinterval property (*John be deciding what to do*); this difference correlates with the difference in entailment patterns observed in (54). In contrast, the process property has to do with the entailments of the progressive sentence itself; specifically, it states that every progressive sentence entails that some process was ongoing. There may or may not be any constituent in the syntax or abstract logical form of progressive sentences which describes this process – this is a matter on which different theories of the progressive may disagree – and hence there may or may not be any constituent with the subinterval property. Thus the process property and the relevance of the subinterval property are distinct observations about the progressive. Nevertheless, they are intuitively related, and they would ideally receive related explanations.

There has been much investigation of the precise nature of those examples, like (54b) and (55), where the present progressive fails to entail its past and future tense counterparts. In fact, the nature of these examples has been so central to theorizing about the meaning of the progressive that the lack of entailment has been given a name: the **imperfective paradox** (Dowty 1977). (This label is a bit misleading, as there is no paradox in the usual sense; rather, the imperfective paradox is an empirical problem with which semantic theory must come to terms.) The remainder of this subsection will be devoted to examples which are important to understanding the imperfective paradox. These data all involve clauses for which the paradox arises, that is, progressives based on clauses which lack the subinterval property.

First, we have what can be called the **interruption principle**. Though a past tense progressive sentence does not in general entail its non-progressive counterpart, it does entail the existence of a process which, if not interrupted, would to the truth of the non-progressive counterpart. Consider Dowty's example (56):

(56) John was crossing the street.

This sentence could be true even if John is hit by a truck when halfway across the street, and so it does not entail its simple past correlate, i.e. that he crossed the street. However, (56), in combination with the assumption that the process which it describes was not interrupted, does entail that he crossed the street. We find principles of this kind discussed especially clearly in the work of Dowty (1977) and Landman (1992). Note the implicit but crucial use of the process principle here: the relevance of interruptions is stated in terms of the process whose existence is entailed by (56).

Second, a range of data closely related to the imperfective paradox concerns the object arguments of verbs of creation. With such verbs, a progressive sentence does not entail

the ultimate existence of an individual of the kind described by the object. For example, (53a) does not entail the existence of a house; we will refer to this property as the **failure of existence entailments**. The progressive contrasts with the simple past (57):

(57) Mary built a house.

Parsons (1990) raises an objection to the claim that (53a) fails to entail the existence of a house; he points out that, even though the sentence does not entail the existence of a complete house, it does entail that something got built which we might call an "incomplete house". Moreover, there are situations in which we are willing to describe an incomplete house as a house (he describes the visiting the house which Jack London was building when he died). While objection is correct as far as it goes, it does not ultimately undermine the claim that the progressive forms of verbs of creation do not entail the existence of a thing describable by the object. As Landman (1992) points out, example (58) (his (9)) can be true even if the creation process bring the unicorn into existence not bit by bit, but rather all of a sudden, at the end of a series of incantations:

(58) God was creating a unicorn, when He changed his mind.

That is, (58) can be true even though nothing came to exist which could, by any stretch, be called a unicorn. Szabo (2004) makes some comments which might be seen as attempting to counter Landman's argument against Parsons. He observes that (59) (his (22b)) can be true even though there is no moment at which one could observe a circle in the water:

(59) Mary drew a circle in the water.

The relevance of this example for analyses of the progressive is that, if this non-progressive sentence fails to entail the existence of a individual of the kind described by the object, one might say that there is really no difference in existence entailments between progressive and non-progressive forms; thus, theories of the progressive would not have to explain any such difference. However, while (59) is interesting, at most it shows that the difference must be explained more carefully. As Szabo himself notes, (59) entails that all of the points of a circle were drawn in the water, even though they did not all exist simultaneously. The progressive counterpart of (59) does not entail even this. Of course we still must come to understand the semantics of (59). It is likely that *draw* is ambiguous, and has a meaning on which is not in fact a verb of creation. Even the quintessential creation verb *make* allows such a use when its object can be construed as shape or path ("hawks makin' lazy circles in the sky", from the musical *Oklahoma*), but not otherwise ("planes makin' loud noise in the sky"). What's different about *draw* is that pretty much any object of *draw* can be construed as a shape, in which case it means something like "make (shape) by means of drawing". In any case, however we come to understand the data with *draw*, Szabo's objection does not appear to touch Landman's central argument based on (58).

The third type of data relevant to the nature of the imperfective paradox concerns the status of altogether implausible outcomes. Landman observes that (60) (his (20)) is clearly false in a circumstance in which Mary was involved in a process of single-handedly attacking the Roman army.

(60) Mary was wiping out the Roman army.

Data like (60) indicate that a progressive sentence PROG+ ϕ entails (or at least, in some sense implies) a modal sentence of the sort "it was not too farfetched a possibility that ϕ ". For example, (60) entails *It was not too farfetched a possibility that Mary would wipe out the Roman army*, and since the latter is false, the former must be as well. Let us call this the **reasonableness principle**. Of course, the notion of reasonableness here demands further explanation.

The fourth point to be made relating to completion entailments and the imperfective paradox is really just a worry about the reasonableness property. Notice that we would consider (60) true (of some appropriate past time) if Mary did in fact succeed in wiping out the Roman army, even though this outcome is not reasonable in the ordinary sense. Thus, we must define "reasonable" for present purposes in such a way that what actually occurs automatically counts as reasonable. Let us call this the **actuality principle**.

The final issue to be mentioned in this section was discussed in various ways by ter Meulen (1987), Asher (1992), Bonomi (1997a), and Portner (1998). In many instances, there is a certain amount of indeterminacy concerning which of several seemingly incompatible progressive sentences is true. Landman discusses a clear example brought up by Roger Schwarzschild: suppose Roger takes a flight scheduled to go to Boston, and it is hijacked to Bismark, North Dakota. Speaking of a single time before the hijacking, either of the following might be considered true (though their conjunction is certainly false):

- (61) a. Roger was flying to Boston (when his plane was hijacked).
b. Roger was flying to Bismark (though he didn't know it).

This type of indeterminacy, which we may refer to as the **indeterminacy property** of progressives, has been discussed as if it only comes about with those sentences which display the imperfective paradox. In other words, the scholars mentioned above seem to assume that any indeterminacy in examples like (54a) (= *John is smiling*) must be of a different sort. Certainly (54a) can be indeterminate in some sense. For example, John might make an expression which is somehow in between a clear smile and a clear grimace; in that case, we may be uncertain as to whether *John is smiling* or *John is grimacing* is true. (We would likewise be uncertain whether *John smiled* or *John grimaced* is true.) As far as I know, we lack any explicit discussion of whether this indeterminacy is fundamentally different from that displayed in (61).

3.2 Theories of the progressive

There are two main theoretical approaches to the semantics of the progressive, what we may call the **event structure theory** and the **modal theory**. The former's main tools are the ontology of events (or similar notions, such as situations) and the relations, especially mereological relations, among these events and between events and ordinary objects. The latter's are the components of the theory of modality, in particular quantification over possible worlds, typically combined with some crucial ideas from the semantics of tense. Many versions of the modal theory also make essential use of events, but this not surprising, given that events are frequently a component of theories of tense and modality. In Sections 3.2.1-3.2.2 we will outline the main ideas of each approach.

In seeking to understand the range of analyses of the progressive, there is a fundamental distinction in direction of analysis which one should observe: some analysis aim to analyze progressive sentences (or VPs) in terms of their non-progressive counterparts, whereas others take the opposite approach. The significance of this distinction is clear when we consider sentences exemplifying the imperfective paradox. On the former (progressive from non-progressive) approach, the progressive form introduces some meaning which removes the entailment of completion; for example, in (53a), the progressive would take a meaning which entails that Mary finished building a house, and derive one which does not entail this (Dowty 1977, Landman 1992, Portner 1992, among others). On the latter (non-progressive from progressive) approach, the non-progressive sentence would be seen as adding a completion entailment to a meaning which otherwise lacks it (see, for example, Parsons 1990, Szabo 2004, Hallman 2009). In general, the modal theory follows the first direction of analysis, while research which follow the event structure theory might take either. See also Kuhn & Portner (2002) for general discussion.

3.2.1 The event structure theory

The most basic version of the event structure theory is outlined by Vlach (1981). His approach takes the process property as the fundamental fact to be explained, and analyzes the progressive schematically as follows:

(62) Prog[ϕ] is defined as Stat[Proc[ϕ] goes on]

Here Prog[ϕ] is the progressive form of a basic sentence ϕ , Proc[ϕ] is the process associated with ϕ , and Stat turns a process into a state. Thus, the meaning of (46), *Mary was walking*, works out as follows: ϕ is the sentence *Mary walk*; since this is a process sentence, Proc[ϕ] is simply the process described by ϕ , i.e. the process of Mary walking, and the whole thing describes the state of this process going on. Note that Vlach's analysis derives the meaning of the progressive from its non-progressive counterpart; thus, he counts on Proc explain the imperfective paradox by removing ϕ 's completion entailments.

A number of points are unclear in Vlach's proposal (a point which he himself emphasizes), including: (i) how does Proc map a sentence to a process in general? (It's easy when that sentence already describes a process, but what about other aspectual classes?) (ii) What is it for a process to go on? And (iii), how is an ongoing process related to a state? Only point (i) receives significant discussion. Vlach states that when ϕ is a process sentence, $\text{Proc}[\phi] = \phi$, whereas when ϕ is an accomplishment or achievement sentence, $\text{Proc}[\phi]$ is a process which "leads to the truth of" ϕ (Vlach 1981: 228). Obviously the crucial next step for an approach such as Vlach's is to define when it is for a process to lead to the truth of a sentence, and one could attempt to give such a definition in various ways. In particular, one might do so in terms of event structure or in terms of modal semantics. Vlach's own comments on the topic suggest that he is thinking in terms of event structures, but he does not go beyond making comments on particular verbs and the puzzles associated with them. However this definition would ultimately be worked out, it must begin with a sentence (i.e., ϕ), or a full sentential meaning like a proposition, since the definition of $\text{Proc}[\phi]$ makes reference to the truth of ϕ . In this way, it is similar to the modal theories, discussed in Section 3.2.2. Most later versions of the event structure theory define the semantics of the progressive not in terms of truth-bearing meanings like that assumed for ϕ , but rather based on the properties of particular events or situations. (A pair of proposals within situation semantics have an intermediate status; Hinrichs 1983 and Cooper 1985 make use of constructs which are intended to be more abstract than events, but more concrete than propositions, namely event types and facts, respectively.)

Parsons (1990) represents the pure event-based approach in its most basic form. He proposes that the only difference between the semantics of a non-progressive sentence and its progressive counterpart is that the former asserts that an event culminates, while the latter asserts that a state holds (based on Parsons 1990: 234):

- (63) a. *Mary arrived* = for some event e : e is an arrival and e 's subject is Mary and e culminates before now.
 b. *Mary was arriving* = for some event e : e is an arrival and e 's subject is Mary, and e 's in-progress state holds before now.

For Parsons, the relation between an event (which culminates) and its in-progress state (which holds) is a primitive fact, not one which can be defined in either direction. The theory can handle the imperfective paradox simply by making sure that no principles suggest an entailment relation between an in-progress state and its corresponding culminating event. However, for the same reason it fails to explain the completion entailment, the fact that (64a) entails (64b).

- (64) a. John is smiling.
 b. John has smiled.

He does present an analysis of this entailment, but the problem is that it is given in terms of a version of the theory presented earlier in the book (Chapter 9), rather than the final version (Chapter 12). In the former version, the meaning of a progressive is not given in

terms of an in-progress state, but rather in terms of an event (a telic event or a process) which "holds". In these terms (63b) says that there was an event of Mary arriving which held before the speech time, and (63a) says that such an event culminated; likewise, (64a) asserts that there is an event of John smiling which holds at the speech time. Parsons proposes that what distinguishes a process verb like *smile* from a telic verb like *arrive* is that, whenever the former is true of an event which holds, it is true of culminating subevents of this event. Intuitively, processes culminate whenever they hold. Given this, (64a) entails (64b), since the latter asserts the existence of a culminating event. While this explanation of (64) is appealing, it cannot be extended directly to the later theory involving states. Rather, he will need to say something like "whenever the in-progress state of a process holds, there exist sub-events of this process which culminate".

At a more basic level, something else is unclear about Parsons' analysis. In (63b), what is the status of event *e*? The formula states that it is an arrival and has Mary as its subject, but it is not located in time; rather, only its in-progress state is located in time. Does the arrival event exist in its fully culminated form outside of our world's time line (perhaps in another possible world), with only its in-progress state being realized? Or does it exist in time but not in a way which is fully culminated? Later scholars working within the event structure approach suggest answers to questions such as these.

A tradition of research including ter Meulen (1985), Bach (1986), Link (1987), and Krifka (1992) further develops the event structure theory. The central idea of this work is that a progressive sentence describes a part of an event, in the same way that a common noun phrase of the form *part of X* describes a part of the individual referred to by *X* (example from Bach 1986):

(65) We found part of a Roman aqueduct.

For example, (64a) would be true iff there exists a part of an event of John smiling. This intuition about the semantics of the progressive suggests an appealing account of the imperfective paradox. As Bach points out, (65) could be true even though the Romans never completed the aqueduct in question. Likewise, (53a) could be true even if there was never a complete event of Mary building a house; all that is required is that a part of such an event exist. This approach to the semantics of the progressive can be referred to as the **partitive analysis**. If the partitive analysis is to really provide a solution to the imperfective paradox, it must be able to explain what it is for there to be a part of an event of building a house, absent a complete building of a house. Both ter Meulen and Bach indirectly approach this question by discussing the analogous one in the nominal domain. Therefore, in order to understand Bach's and ter Meulen's analyses of the progressive, we must begin with their background assumptions about nominal semantics.

The crucial ideas for the partitive analysis originate in Link's (1983) theory of plurals and mass terms. Link proposes that nominal semantics be cast in terms of a highly structured domain consisting of at least two sub-domains, the count domain and the mass domain. Each of realizes a rich mereological (part-of) structure, with the difference between the

two being that the count domain is atomic (minimal units are "atoms", others are pluralities), whereas the mass domain is not (in principle, bits of stuff are indefinitely divisible). The mass domain is a subset of the atoms (and hence is a subset of the count domain), reflective the idea that bits of stuff are themselves objects which can be counted. And finally, the domains are related by a homomorphism h from count to mass, such that for any object o in the count domain, $h(o)$ is the stuff of which o is made. See Figure 1:

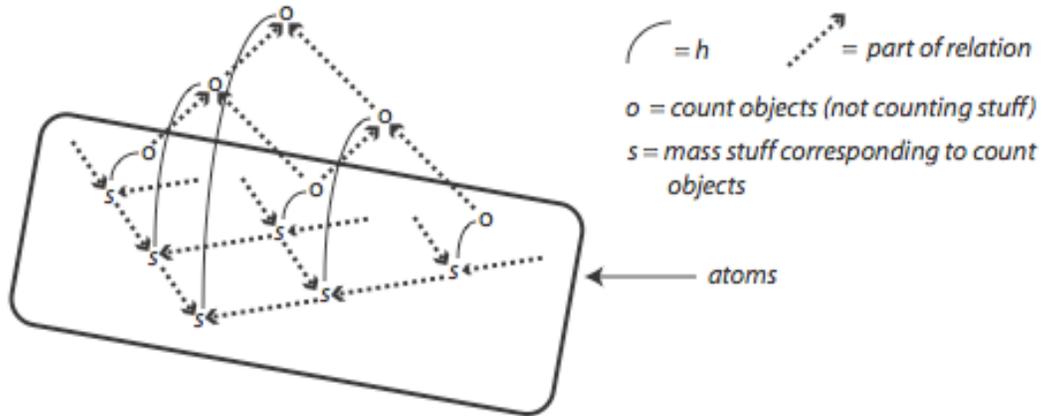


Figure 1: the Partitive Analysis

The denotation of a count noun is a subset of the count domain (objects labeled either o or s), while that of a mass noun is a subset of the mass domain (objects labeled s). Typical count nouns describe objects not in the mass domain (objects labeled on o), but since the mass domain is a subset of the count domain (specifically, a subset of the set of atoms), a count partitive like *part of a Roman aqueduct* can describe a element of the mass domain.

If we insist (as might be thought natural) that something can be a part of an aqueduct only if there is an aqueduct it is part of, the relations might work as follows: the top o in Figure 1 is the whole aqueduct; the s which corresponds to o , i.e., $h(o)$, is the stuff of which it is made; each part o' of o is a part of the aqueduct; and for any such o' , $h(o')$ is the stuff that part is made of. But Bach wants us to think of things somewhat differently, since he wants for there to be a way to have a part of an aqueduct which is not part of any complete aqueduct. He suggests that we have a concept of aqueduct stuff, from which we may define the set of parts of an aqueduct directly, without reference to complete aqueducts. For example, the maximal s (the s lowest in the diagram) might be the all of the stone which makes of the structure under discussion in (65). Given its appearance, we classify it as aqueduct-stuff. In light of this, each o in the diagram, mapping onto aqueduct-stuff by h , is a part of an aqueduct. Yet there is no complete aqueduct.

Bach and ter Meulen would like for us to imagine the solution to the imperfective paradox on analogy to Figure 1. The model should be extended to include events and processes, with the former corresponding to the count domain and the latter to the mass domain. Hence, the progressive sentence (64a) is true iff some Mary-smiling process s went on, and the non-progressive (64b) is true iff some Mary-smiling event o took place. Likewise, a sentence exemplifying the imperfective paradox, for example (53a), is true iff there is some Mary-building-a-house process s . As with the aqueduct, this does not entail that a complete event of building a house took place, though it does entail that part of such an event did.

As can be seen, this analysis understands a process of building a house as not being defined in terms of complete events of building a house. Nothing said so far explains what it is for an object to be complete (a complete aqueduct or house-building event), and early proponents of the partitive analysis like Back do not discuss the issue. Crucially, however the notion of completeness is analyzed, this is where the difference between sentences with the subinterval property and those lacking it will be explained. For example, we must ensure that, if (64a) is true (i.e., if there is some John-smiling process), some complete smiling event exists. In contrast, if (53a) is true (i.e., if there was some Mary-building-a-house process), this does not ensure that there was any corresponding complete event.

The above sketch is based essentially on Bach's work, and we find very similar ideas of ter Meulen, Link, and Krifka. None of these papers gives a full-fledged defense of the partitive analysis (and in some cases, much less detail than the above). More recently, Hallman (2009) attempts to work out the analysis in more detail, aiming both to provide empirical support in its favor and to determine precisely what assumptions need to be made if it is to explain the imperfective paradox.

Hallman's novel argument in favor of the partitive analysis has to do with the entailments of progressive sentences containing proportional quantifiers. Consider (66a) (his (5a)):

- (65) a. The machine was rejecting exactly one third of the transistors.
b. The machine rejected exactly one third of the transistors.

Hallman points out that (65a) entails a fairly even distribution of rejection events among all of the events where the machine either accepts or rejects a transistor. Crucially, it is not true of the initial minute of a three minute interval in which the machine rejects no transistors for the first two minutes, and all of them during the final minute. By way of comparison, note that the non-progressive (66b) (his (4a)) would be true of the three minute interval. Thus, one cannot simply say that the progressive sentence (65a) is true of any part of an event in which (65b) is true. Rather, we must have an understanding of the process of rejecting exactly one third of the transistors which implies that the rejections are fairly evenly distributed.

Hallman's basic analysis of the progressive operator is as follows:

(66) $\text{PROG}(\phi)$ is true of a situation s iff ϕ is true of all relevant subsituations of s .

The analysis in (66) treats the process property as the core of the progressive's meaning. Given an appropriate treatment of quantifiers (see the paper for details), it explains the entailment of even distribution seen in (65a), since every relevant subpart of the situation described must be one in which the machine rejects exactly one third of the transistors. Moreover, according to Hallman, the progressive presupposes that ϕ is **cumulative**, in the sense of Krifka (1998): if ϕ is true of any pair of situation s_1 and s_2 , it is true of their sum, s_1+s_2 . This cumulativity requirement explains the infelicity of (67) (his (26b)), since *reject exactly six transistors* is not cumulative:

(67) #The machine was rejecting exactly six transistors.

In order to extend this analysis to sentences in which the progressive does not seem to apply to a cumulative sentence, like (53a), Hallman argues that all predicates are basically cumulative. In other words, like Parsons, Szabo, and others, he proposes that the scope of the progressive in (53a) is a phrase which does not entail that a complete house is ever built. The completion entailments of the non-progressive *Mary built a house* (that the event culminated with a production of a complete house), must come from elsewhere.

Hallman goes farther than the advocates of the partitive analysis mentioned above in making a precise proposal concerning the source of completion entailments, building on the work of Kratzer (2004). Kratzer proposes that telicity is the result of a telic operator *[telic]* which applies to verb stems, adding the requirement that every part of the theme argument participates in the event. Assuming that V takes an event and a theme argument, Kratzer's definition of the telic form of V amounts to the following:

(68) $[\textit{telic}](V) = \lambda x \lambda e [V(e, x) \wedge \forall x' [x' \leq x \rightarrow \exists e' [e' \leq e \wedge V(e', x')]]]$

According to Hallman, the atelic form of *build* entails that for some part of its theme, the subject built that part. Applying *[telic]* to this, we gain the entailment that every part of the theme has a part which is built by the subject. In the case of Mary building the house, this implies that every part of the house was built.

A crucial difference between Hallman's version of the partitive analysis and that advocated by Bach, ter Meulen, and Parsons is that Hallman assumes that the theme argument itself (e.g., *the house*) is not interpreted partitively. That is, *house* must describe a complete, actual house, since otherwise, the adding *[telic]* to the verb would only entail that Mary built whatever is part of a house is described by *house*. Hence, unlike the other advocates of the partitive analysis, Hallman does not analyze nominal partitives and progressives in parallel, but rather seeks to base a partitive analysis of the progressive on a non-partitive analysis of the theme argument.

Because it does not treat the object of a progressive verb partitively, Hallman's analysis cannot explain the failure of existence entailments in the same way as other partitive

theories. In particular, applying (66) to (53a) entails that a complete house existed (and that at least part of it was built by Mary). In order to deal with this, he proposes to add a modal component to the progressive's meaning. In particular, he modifies (66) with the goal of allowing that the house exist in its complete form not in the actual world, but in some other possible world:

- (69) $\text{PROG}(\phi)$ is true of a situation s iff ϕ is true of all relevant subsituations of s and $[\textit{telic}]\phi$ is true in some possible situation s' .

(There are a few unresolved technical problems here, including that Kratzer's *[telic]* operator applies to verbs stems, not to predicates or whole sentences, but we set them aside to focus on more conceptual issues.) Applied to (53a), the idea is that Mary built a complete house in some possible world (the world of s'), and that in the actual world (the world of s) she built a part of it. The thing which she built in the actual world is classified as a part of a house on the grounds that it is part of a complete house in another possible world. It is never made clear, however, exactly what assumptions are being made about the denotation of the common noun *house*. If it is meant to apply to parts of houses, it seems that the non-progressive sentence will fail to have the correct completion entailments, as discussed above: *[telic]* will only add the entailment that every part of the possibly incomplete house was built. Yet if it is meant to apply only to complete houses, adding the modal component to (69) will not fix the problem it is designed to fix, since the first conjunct of (69) is identical to (66), and hence by itself entails the existence of a complete house.

3.2.2 The modal theory

The first and purest version of the modal theory was proposed by Dowty (1972, 1977, 1979). Dowty's modal theory is pure in that it treats the progressive as an operator with a semantics very similar to that typically assigned to modal auxiliaries within formal semantics: the progressive combines a temporal reference with quantification over possible worlds (based on Dowty 1979:149):

- (70) $\text{PROG}(\phi)$ is true at an interval I and world w iff there is an interval I' such that I' is a non-final subinterval of I , and for all $w' \in \text{INR}(\langle I, w \rangle)$, ϕ is true at I' and w' .

INR is an accessibility relation as in modal semantics; $\text{INR}(\langle I, w \rangle)$ picks out the set of worlds (known as **inertia worlds**) which are like w up through I , and in which what is going on in w up through I continues "in ways most compatible with the past course of events" (Dowty 1979: 148). For example, (53a) is true at $\langle I, w \rangle$ iff in all worlds w' which are like w up through I , and in which matters develop in ways most compatible with what was going on in w before and during I , I develops into an interval I' in which Mary builds a house. More intuitively, Mary was doing something during I which, in worlds which unfold "normally" from that point on, she builds a house. (One might object that it is not accurate to call this a "pure" modal meaning, given that it involves a crucial reference to temporal relations; however, the meanings of classical modals like the modal auxiliaries also involve temporal notions (see Portner 2009 for discussion), so

Dowty's analysis of the progressive is close to as purely modal as could be found in natural language. It is, of course, not pure when compared to the operators of modal logic.)

As a modal theory, Dowty's analysis easily solves the problem of the failure of existence entailments. The house in (53a) need not exist in the actual world, only in the accessible worlds w' . Dowty also discusses the no-statives property, endorsing an explanation that combines ideas outlined by Taylor (1977) and Carlson (1977). The idea is that stage-level predicates (including stage-level statives) are true or false at definite intervals, and so the meaning in (70) makes sense for them. In contrast, individual-level predicates indicate dispositions which are present at any moment within an interval as much as at any other; for this reason, it makes sense that we would not use a device like PROG in (70) for indicating a subinterval of a larger interval in which the non-progressive ϕ is true. This explanation is weak in that it does not predict that stage-level statives like *sit in the chair*, which are also true at any moment of an interval in which they are true, are different from individual-level statives, but Dowty sees such weakness as acceptable, arguing that we can only provide a plausible reason why individual-level statives are not possible, not a formal derivation of their ungrammaticality. Note that Carlson rules out progressives of individual-level predicates syntactically, an approach which is compatible with Dowty's analysis, though not one he chooses to follow.

Dowty's analysis also has important consequences for understanding the process property, though these are somewhat hidden in his broader discussion. His ideas on the progressive are embedded in a larger decompositional analysis of aspectual classes within interval semantics in a way which goes far towards explaining the process property (provided we set aside the specific problem for Dowty's analysis discussed below). The key to this explanation is the fact that (70) refers to a non-final subinterval of an interval in which the non-progressive ϕ is true: because it's an interval, an event which is otherwise seen as instantaneous must be construed as having duration, and because it's non-final, it must have to do with the process which goes on before a culminating event culminates.

Dowty also argues that the futurate progressive illustrated in (48) can be analyzed in the same terms as the regular "imperfective" progressive. He argues that such examples are simply the combination of the imperfective progressive with the tenseless future (e.g., *Mary leaves town tomorrow*). As discussed by many scholars (see Dowty's work for references), the tenseless future conveys a sense of planning or predetermination which is shared by the futurate progressive; thus (48) suggests that Mary has made plans to depart tomorrow. However, compared to the tenseless future, the futurate progressive implies less certainty. The contrast is illustrated in (71), Dowty's (1979) example (41):

- (71) a. The sun sets tomorrow at 6:57 PM.
b. *The sun is setting tomorrow at 6:57 PM.

According to Dowty, (71a) means roughly that, at some point at or before the speech time, the facts determined that the sun sets at 6:57 tomorrow. If we combine this

meaning with the semantics for the progressive in (70), we have the following: for some interval of time I containing the speech time, the facts before I determined that, for all futures during which what was going on during I continues normally, the sun sets at 6:57. Crucially, the set of futures in which the sun sets at 6:57 according to (71b) may be a subset of those in which it sets according to (71a). In particular, certain futures (relative to the speech time) may not contain I , and moreover some of the futures which contain I may not be involve inertia worlds. Thus, the analysis predicts that (71b) is weaker than (71a).

Despite its many advantages, Dowty's theory suffers from a problem which has led other authors to either modify or abandon the modal theory. Vlach (1981) points out that Dowty's definition of the set of inertia worlds does not work in many examples displaying the imperfective paradox. Consider (72):

(72) Max was crossing the street.

This sentence can be true (at an interval I) even if shortly after I a bus runs over Max. According to the analysis, it would be true if, in every world in which what is going on during I continues in ways most compatible with past events, Max crosses the street. But the bus was traveling down the street towards Max during I , and surely the expected way for events to unfold includes Max being hit. The problem here is that Dowty's definition of inertia worlds looks at what's going on throughout the entire world before and during interval I , and (72) can be true even in a world where Max being run over is all but inevitable.

Next we turn to the ways in which later modal theories have attempted to solve the problem posed by (72). Here we will consider four such theories: Asher (1992), Landman (1992), Bonomi (1997a), and Portner (1998). In the most general terms, they all agree on what must be done: something must be added to Dowty's analysis which will allow one to ignore the trajectory of the bus in evaluating (72). In other words, the core idea is that, if we ignore (for the time being) the oncoming bus, Max would have crossed the street. The question is how to ignore the bus. We see the following two main ideas:

1. **Events** or situations play an essential role in the semantics of the progressive. Events are useful because they are smaller than worlds in both temporal and spatial extent, and so the bus might be outside of the event(s) we pay attention to.
2. Progressives are evaluated with respect to a **perspective**. A perspective is something which selects a subset of the information available in a situation, and so can allow us to ignore information about the bus.

All of the modal analyses discussed below make use of events, and most also make use of the concept of perspective (though not always under that name). Moreover, particular analyses employ other interesting concepts, such as default semantics (Asher) or a closeness relation among worlds (Landman).

Each of the post-Dowty modal theories begins with the idea that a progressive sentence describes an event if and only if that event is part of an event of the kind described by the phrase under the scope of the progressive in relevant possible world or worlds. For example, (53a) is true of an event of Mary pouring concrete into a hole in the ground if this event is part of an event of building a house in the relevant possible world(s). Such an approach promises to maintain all of the advantages of Dowty's theory, if it can solve the problems with sentences displaying the imperfective paradox. Where the various modal theories differ is in how the relevant possible worlds are identified.

Portner (1998) takes the approach closest to Dowty's, aiming to treat the progressive as very similar to an ordinary modal operator. Portner works with a more sophisticated theory of modality than Dowty's, building on Kratzer's work (Kratzer 1977, 1982; for a description of Kratzer's theory, see article 58 (Hacquard) *Modality*). In this context, he proposes that the progressive is a modal operator with (i) a circumstantial modal base, indicating that only worlds in which certain contextually specified facts hold, and (ii) a "non-interruption" ordering source, indicating that worlds in which the event is interrupted are to be ranked as less relevant than those in which it is not. For example, in the case of (53a), the modal base would include propositions like "Mary has purchased such-and-such supplies", "Mary intends to build a house", "Mary follows proper architectural plans for a house", the ordering source would contain propositions like "Mary is not injured" and "Mary does not run out of money". Given this background, the sentence would be true iff there was an event which, in all worlds compatible with this modal base, and in which as many of the ordering source propositions as possible are true, she builds a house. This basically means "Given the relevant facts, if she was not interrupted, Mary built a house".

Bonomi (1997a) has a very similar analysis, though one that is couched in terms which are not as closely tied to ideas familiar from the theory of modality. Bonomi's theory uses two contextually given parameters as well, a **Context of facts** and a **Stereotypical frame**. The former is very similar to the modal base: it is a set of events, and the meaning of the progressive only depends on courses of events in which all of these events occur; and the latter is very similar to the ordering source: we select from the relevant courses of events those in which the event in question develops normally. Hence, example (53a) is true iff, for some past event e , there is a set of relevant events (i.e., a context of facts) including e , and there is a stereotypical frame which says that in all courses of events in which the relevant events occur, and in which in which e develops normally, e is an event of Mary building a house.

Asher's (1992) system uses techniques even farther removed from the usual theories of modality, but the core idea remains the same. His analysis is based on a default, nonmonotonic conditional operator $>$. The statement $A > B$ can be read as "If A, infer B, unless there are specific reasons not to", or even "If A, then as a default B". Given this, Asher aims to treat progressives as an indication that some event occurred which would as a default lead one to infer that an event of the kind described by the phrase under the scope of the progressive occurred. Hence, (53a) means that some event occurred, the occurrence of which would as a default lead one to infer that Mary built a house.

The final post-Dowty modal theory we will consider is that of Landman's (1992). His analysis develops the modal theory using ideas which are quite unique to the progressive, and not based on ideas found in the literature on modality. (Despite, it is still properly called a "modal theory", since the truth of a progressive sentence may depend on what happens in possible worlds other than the actual one.) For Landman, the key concept on which the rest of the analysis is built is that of one event being a **stage** of another. Stage-of is a sub-relation of part-of, so if an event is a stage of another, it is also part of it, but stage-of is more specific: "An event is a stage of another event if the second can be regarded as a more developed version of the first" (Landman 1992: 23). The idea of Landman's analysis, then, is that (53a) is true iff an event was going on which is a stage of (an event of) Mary building a house in the closest possible world in which all of its stages are realized (provided this world is "reasonable"). His precise analysis is developed in terms of a recursive definition of the **continuation branch** of an event; the continuation branch is designed to identify the closest possible world in which all of the event's stages are realized. For reasons of space, we will not examine the Landman's definition of continuation branch here.

As they are stated above, Porter's, Bonomi's, Asher's, and Landman's analyses all suffer from a failure to come to terms with the indeterminacy property discussed above. Consider (72). These theories all say, roughly, that this sentence is true iff an event was going on which would, if it developed normally, become an event of Max crossing the street. But couldn't we also look at this very same event, and describe it as in (73) (supposing that he did in fact walk into the path of a bus)?

(73) Max was walking into the path of an oncoming bus.

It seems that there are at least two incompatible ways that one and the same event could develop normally. This seems to show that the definition of "normal" must depend on more than just the facts about the event.

One way to respond to this problem would be to deny that (72) and (73) concern the same event. That is, prior to the arrival of the bus, Max was actually participating in two events: a street-crossing event (which was never completed) and a bus-intersecting event (which was). While formally this would solve the difficulty, it presents us with the challenge of explaining how these two events differ, and while it may be possible to meet this challenge, modal theories of the progressive have not taken this approach. Rather, they have dealt with the problem by assuming that a single event is relevant, but that this event can be seen in different ways. A "perspective" is intuitively a way of seeing an event or situation. One perspective makes us see what Max did as part of crossing the street, while another perspective makes us see it as part of an accident involving the bus. These two perspectives are relevant to the two ways of describing the event in (72)-(73).

Each theory develops the concept of perspective differently. For Portner, the property expressed by the predicate under the scope of the progressive contributes the perspective, and it is an argument of the modal base. Thus, it helps determine the set of relevant

worlds by determining which facts about the world are to be considered; for example, in (73), we consider facts about the bus, while in (72), we do not. For Bonomi (who has an extensive discussion about perspective), both the Context of facts and Stereotypical frame are contextually determined, and are responsible for representing the perspective (or "point of view", as he terms it when describing his own analysis). For Asher, a perspective is a way of describing the event, and it feeds into the semantics as the antecedent of the default operator; hence, Asher hypothesizes that you can describe Max's walking event in different ways, one of which leads to the default conclusion that he crosses the street, the other to the default conclusion that he is hit by the bus. Landman notes the importance of perspective, but does not formalize it within his theory. Given that these scholars each develop the concept in a way designed to fit into the mechanics of the particular overall analysis, it is difficult to compare them directly. None of them relate the concept to a discussion of broader issues within semantic theory in a way which would allow us to bring to bear other knowledge in determining which analysis is superior to the others.

3.3 Progressive and imperfective

As pointed out above, many languages describe situations which would be described in English with the progressive by using a more general-purpose verb form, and this phenomenon has received significant attention within semantic theory in connection with the analysis of the imperfective in Romance languages. An example is the Spanish (47) above, from Cipria & Roberts (2000): this sentence naturally receives a reading very similar to the English past progressive, but the same verb form can express other meanings, including habituality, intention, and the simple past occurrence of an atelic event. French and Italian show a similar (but not identical) range of meaning. (Note that the imperfective always conveys past tense, a component of its meaning we ignore here.) In the semantics literature, we see three approaches to understanding the semantics of imperfectives:

1. Underspecification and coercion. de Swart (1998) argues that the imperfective places a purely aspectual restriction on the clause it combines with (specifically, it must describe a process or state). If the compositional semantics of this clause meets the condition, this by itself determines the meaning. Otherwise, a process of coercion shifts the meaning into one which meets the aspectual restriction.
2. Unified meaning within modal semantics: Cipria & Roberts (2000) provide an analysis of the Spanish imperfective which aims to provide a unified semantic value covering all of its various intuitive meanings. This unification has a temporal component, reflecting the fact that the imperfective in Spanish always concerns the past, and a modal component; the distinctions among intuitive meanings are based on the choice of modal accessibility relation. Within this framework, the modal analysis of the progressive (specifically, the version developed by Dowty) is a special case. Ferreira (2004) and Deo (2009) have developed similar ideas; Bonomi (1997b) also aims for a unified semantic analysis, but in rather different terms.

3. Syntactic explanation: Hacquard (2006) argues that the various meanings of the imperfective are introduced by distinct, phonologically null operators. In the case of the progressive, she assumes a PROG operator as defined by Portner. The imperfective is used when one of the relevant class of operators is present immediately under the scope of tense. Conversely, the perfective form is used when a perfective operator occurs in that position.

While all three approaches are intuitively appealing, there has been little direct comparison of one to another. It is likely that we will not make real progress in understanding the relation of the imperfective to the progressive, and in understanding the semantics of the imperfective more generally, until clear arguments are given for preferring one approach to the others.

3.4 Final discussion of the progressive

As we have seen, semantic analyses of the progressive fall into two major groups: event-structure theories and modal theories. There is some overlap between the two (for example, Hallman's theory is basically an event-structure theory, but has a modal component), and there is a great deal of diversity within each group. Many analyses, even influential ones like Bach's, are given briefly, and as a result fail to address the full range of data relevant to the analysis of the progressive. In light of this situation, it may be useful to summarize whether each approach attempts an explanation of the major properties of the progressive outlined in Section 3.1. Table 2 provides such a summary. Of course Table 2 should not be taken as an evaluation of theories, since each has important advantages and problems, including many discussed above.

Table 2: Theories of the Progressive

	No statives	Process	Completion property	Imperfective paradox	Failure of existence	Reasonableness	Actuality	Indeterminacy
Vlach	Y	Y	Y	Y	N	N	N	N
Parsons	N	N (Y)	N (Y)	Y	N	N	Y	N
Bach	N	Y	N	Y	Y	N	N	N
Hallman	N	Y	Y	Y	Y	Y	N	N
Dowty	Y	Y	Y	N	Y	N	N	N
Portner	N	N	Y	Y	Y	Y	Y	Y
Bonomi	N	N	N	Y	Y	Y	Y	Y
Asher	N	N	N	Y	Y	Y	Y	Y
Landman	N	Y	Y	Y	Y	Y	Y	N

Note that a "Y" only means that an explanation is offered -- not that it must be evaluated as successful. In most cases I list "N" when a given author does not explicitly discuss a particular problem, even though one could imagine him or her adopting the explanation presented as part of another analysis; occasionally I list "Y" when a paper can be construed as implying an explanation for a given phenomenon, even though the point is not made clearly. For Parsons theory, "N (Y)" indicates that an explanation is offered in terms of the version of the analysis given in Chapter 9, but not in the version given in Chapter 12.

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